DEC. 1935

MODERN MECHANIX & INVENTIONS MAGAZINE

15 CE

MODERN MECHANIX

& INVENTIONS MAGAZINE

December

NSC

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IN CANADA 20¢

FILMING TABLE TOP EARTHQUAKES
SEE PAGE 42

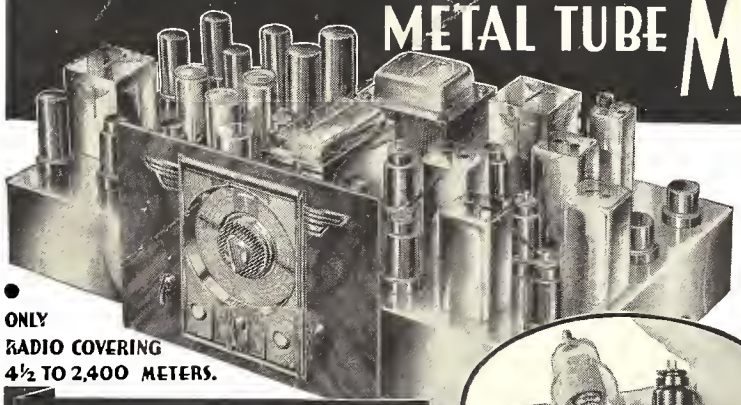
"Gasless" Touring in a Diesel Auto by C. L. Cummins

BIG $1,750.00 CASH PRIZE CONTE

SAVE UP TO 50% *by* BUYING YOUR RADIO *Direct from* MIDWEST LABORATORIES

Glorious Tone Realism.. World-Wide Entertainment Guaranteed!
with New 1936 SUPER *Deluxe*

METAL TUBE MIDWEST

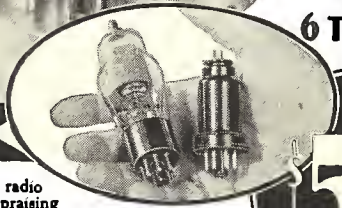


18 TUBE RADIOS

6 TUNING RANGES

● ONLY RADIO COVERING 4½ TO 2,400 METERS.

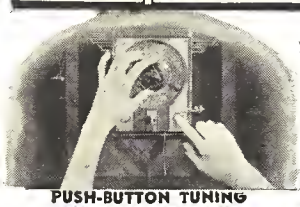
30 Days FREE Trial!



WORLD'S GREATEST RADIO VALUE

$59.50 *with New* GIANT THEATRE-SONIC SPEAKER (LESS TUBES)

TERMS AS LOW AS $5.00 DOWN



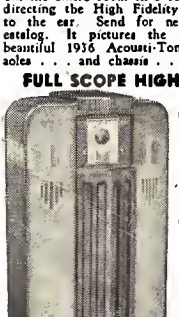
PUSH-BUTTON TUNING
(Noises Suppressed)

Now, Push-Button Silent Tuning is offered for first time! Simply pushing Silencer Button hushes set between stations . . . suppresses noises. Pressing Station Finder Button automatically indicates proper dial position for bringing in extremely weak stations.

Acousti-Tone V-Spread Design
(Patent Pending)

. . . Establishes a new radio style overnight! The V-Front Dispersing Vanes were developed by Midwest engineers as a result of a study of directional effect of the Midwest Full Scope High Fidelity Speaker. These Vanes spread the beautiful lacework of the "highs" throughout the entire room in a scientific manner . . . directing the High Fidelity waves uniformly to the ear. Send for new FREE 40-page catalog. It pictures the complete line of beautiful 1936 Acousti-Tone V-Spread consoles . . . and chassis . . . in four colors.

FULL SCOPE HIGH FIDELITY
Brilliant Concert Tone



Now, get complete range of audible frequencies from 30 to 16,000 cycles, being transmitted by four new High Fidelity Broadcasting stations—W1XBS, W9XBY, W2XR and W6XAL. Glorious new Acousti-tone is achieved . . . assuring life-like, crystal-clear "concert" realism.

V-FRONT

EVERYWHERE, radio enthusiasts are praising this amazingly beautiful, bigger, better, more powerful, super selective, 18-tube 6-tuning range radio. They say it is a tremendous improvement over Midwest's 16-tube set, so popular last season. It is sold direct to you from Midwest Laboratories at a positive saving of 30% to 50%. **(This statement has been verified by a Certified Public Accountant who conducted an impartial survey among representative Ohio, Kentucky and Indiana raido retailers.)** Before you buy any radio, write for FREE 40-page 1936 catalog. Never before so much radio for so little money. Why pay more? You are triple protected with One Year Guarantee, Foreign Reception Guarantee and Money-Back Guarantees! This super Midwest will out-perform $200 to $800 sets on a point-for-point comparison. That is why nationally known orchestra leaders like Fred Waring, George Olsen, Jack Denny, Ted Fio Rito, and others use Midwest sets to study types of harmony and rhythmic beats followed by leading American and Foreign orchestras.

80 ADVANCED 1936 FEATURES

Scores of marvelous features, many exclusive, explain Midwest super performance and thrilling world-wide all-wave reception . . . enable Midwest to bring in weak distant foreign stations, with full loud speaker volume, on channels adjacent to locals. Only Midwest offers so many features . . . only Midwest tunes as low as 4½ meters . . . only Midwest gives the sensational new Push-Button Tuning feature, etc. See pages 12 to 21 in FREE catalog for description of the 80 features. Read about advantages of 6 Tuning ranges . . . offered for first time: E, A, L, M, H and U. They make this Super De Luxe 18-tube set the equivalent of six different radios . . . offer tuning ranges not obtainable in other radios at any price!

DEAL DIRECT WITH LABORATORIES

No middlemen's profits to pay—you buy at wholesale price direct from laboratories . . . saving 30% to 50%. Increasing costs are sure to result in higher radio prices soon. Buy before the big advance . . . NOW . . . while you can take advantage of Midwest's sensational values. You can order your Midwest 1936 Full Scope High Fidelity Acousti-Tone radio from the 40-page catalog with as much certainty of satisfaction as if you were to come yourself to our great radio laboratories. You save 30% to 50% . . . you get 30 days FREE trial . . . as little as $5.00 puts a Midwest radio in your home . . . Satisfaction guaranteed or money back. Write today, for FREE catalog.

SAVE UP TO 50%

Thrill to new explorations in sections of radio spectrum that are strangers to you. Every type of broadcast from North and South America, Europe, Asia, Africa and Australia is now yours. Send today for money-saving facts.

GEORGE OLSEN PRAISES LIFE-LIKE TONE REALISM

Long Island, N. Y.—After comparing many different makes, I finally decided upon Midwest. It out-performs other radios costing almost twice as much. The crystal-clear tone is so life-like that it sounds as though I am in the studios, actually hearing artists performing. *Geo. Olsen*

TODAY'S FINEST RADIO SAYS TED FIO RITO

My new Midwest is finest radio I have had pleasure of hearing. Bass-Treble control is marvelous . . . enables one to hear every instrument in orchestra. *Ted Fio Rito*

METAL TUBES

This Midwest is engineered from the ground up to see either the new METAL tubes or glass-metal counterpart tubes. Octal sockets and newest circuits permit use of either type . . . just as you desire.

MAIL COUPON TODAY! FOR *FREE* 30-DAY TRIAL OFFER *and* 40-PAGE FOUR-COLOR *FREE* CATALOG

MIDWEST RADIO CORP.,
Dept. 10-F, Cincinnati, Ohio

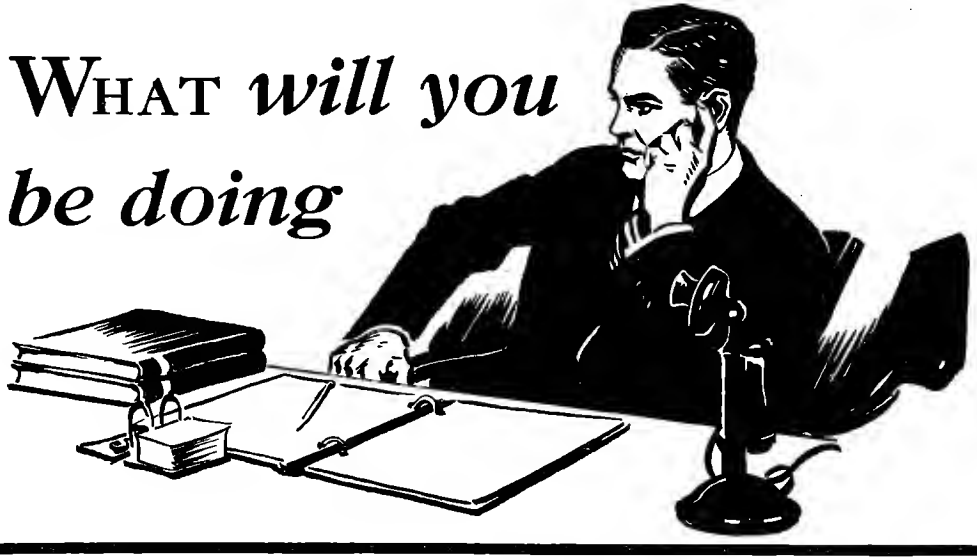
Without obligation on my part, send me your new FREE catalog, complete details of your liberal 30-day FREE trial offer, and FREE Miniature Rotating 18-tube Dial. This is NOT an order.

User-Agents Make Easy Extra Money
Check Here for details ☐

Name_____
Address_____
Town_____ State_____
☐ Check here if interested in a Midwest All-Wave Battery Radio

MIDWEST RADIO CORP.
DEPT. 10-F CINCINNATI, OHIO U.S.A.
Established 1920 Cable Address MIRACO All Codes

WHAT *will you be doing*



ONE YEAR *from today?*

THREE hundred and sixty-five days from now—what?

Will you still be struggling along in the same old job at the same old salary—worried about the future—never able to make both ends meet?

One year from today will you still be putting off your start toward success—thrilled with ambition one moment and then cold the next—delaying, waiting, fiddling away the precious hours that will never come again?

Don't do it, man—don't do it.

There is no greater tragedy in the world than that of a man who stays in the rut all his life, when with just a little effort he could advance.

Make up your mind today that you're going to train yourself to do some one thing well. Choose the work you like best in the list below, mark an X beside it, and without cost or obligation, at least get the full story of what the I. C. S. can do for you.

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 2317-F, SCRANTON, PENNA.

★ **Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X:** ★

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☐ Architectural Draftsman	☐ Sheet Metal Worker	☐ Heating ☐ Ventilation	☐ Bridge and Building Foreman
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☐ Structural Draftsman	☐ Mechanical Engineering	☐ Steam Electric Engineer	☐ Coal Mining
☐ Structural Engineer	☐ Mechanical Draftsman	☐ Marine Engineer	☐ Mine Foreman
☐ How to Invent and Patent	☐ Machinist ☐ Toolmaker	☐ R. R. Locomotives	☐ Navigation
☐ Electrical Engineer	☐ Patternmaker	☐ R. R. Section Foreman	☐ Cotton Manufacturing
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DECEMBER
1935

MODERN MECHANIX
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NRA CODE

Volume XV
Number 2

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Learn ELECTRICITY

STUDENTS BUSY AT WORK IN LARGE COYNE SHOPS

SEND TODAY FOR DETAILS OF MY

Pay-Tuition-after-Graduation Plan!

Get training in 90 days, right here in the big Coyne Shops — **not by correspondence** — but on real electrical machinery. **Mail the coupon below.** If you are short of money I'll send you all details of my finance plan and consider your application. If accepted, you won't have to start paying tuition back until **five months from the date you start school,** and then you'll have **over a year** to complete your payments.

Tremendous Developments Ahead in Electricity!

HERE is YOUR opportunity to cash in. Every day brings news of new developments in every branch of Electricity, with more opportunities, more jobs, and a greater future for the trained man than ever before. I consider the fellow who is ambitious enough to want to get ahead by taking my Training, worthy of my help. MAIL THE COUPON BELOW and you can prove to me that you are willing to spend just THREE MONTHS in the Coyne Training Shops Learning ELECTRICITY. Then, I'll tell you about my finance plan, which has enabled many to get complete Training and pay tuition back later.

H. C. Lewis

Learn By Doing In 90 Days

Lack of experience or advanced education bars no one. I don't care if you don't know an armature from an air brake—I don't expect you to! It makes no difference! Don't let lack of money hold you back from getting all details of my amazing plan.

MANY EARN While LEARNING

If you need part-time work to help pay your living expenses and will tell us your problems we may be able to help you as we have thousands of others. Then in 12 brief weeks, in the great roaring shops of Coyne, we train you as you never dreamed you could be trained . . on one of the greatest outlays of electrical apparatus ever assembled . . real dynamos, engines, power plants, auto, switch-boards, transmitting stations . . everything from doorbells to farm power and lighting . . full-sized . . in full operation every day!

TRAINING *By Actual Work*

No dull books . . . you get individual training . . . real actual work with only the theory you will need. Building real batteries . . . winding real armatures, operating real motors, dynamos and generators, wiring houses, etc. That's a glimpse of how we help to make you a master electrician, and fit you to qualify for jobs leading to the biggest pay.

Prepare for Jobs Like These

Here are a few of hundreds of positions in the electrical field. Our free employment bureau gives you a life-time employment service.

ARMATURE EXPERT
SUBSTATION OPERATOR
AUTO ELECTRICIAN
INVENTOR
MAINTENANCE ENGINEER
SERVICE STATION OWNER
RADIO EXPERT

Jobs-Pay-Future

"I owe my Electrical success to your 12 week shop course," says R. B. Umbarger of Tennessee. "Two weeks after leaving school I took a wiring job," reports E. O. Berndt of Illinois, "and the profits from this one job alone more than paid for the entire course." A. C. Hoehnle of Ohio says "Received several raises in pay, due to the training I received at Coyne." And I could quote from hundreds of letters of successful Coyne Trained Men. *What they have done, you should be able to do!*

Electric Refrigeration —Air Conditioning

Right now I am including my new Electric Refrigeration and Air Conditioning course at no extra cost.

GET THE FACTS

Coyne is your one great chance to get into electricity. This school is 36 years old—Coyne training is tested — proven beyond all doubt — endorsed by many large electrical concerns. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne book with photographs . . . facts . . . jobs . . . salaries . . . opportunities. Tells you how many earn expenses while training and how we assist our graduates in the field. This does not obligate you. So act at once. Just mail coupon.

Get This FREE Book

Home of Coyne School

This is our fireproof modern home wherein is installed thousands of dollars' worth of Electrical equipment of all kinds. Every comfort and convenience has been arranged to make you happy and contented during your training.

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Coyne Electrical School, Dept. 95-53
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Name.....*Age*....

Address.....

City.....*State*.....

LEARN AT HOME TO

I'LL TRAIN YOU QUICKLY

FOR GOOD SPARE TIME AND FULL TIME

RADIO JOBS

MANY MAKE $30 $50 $75 A WEEK

If you are dissatisfied with your present job—if you are struggling along in a rut with little or no prospect of anything better than a skinny pay envelope—CLIP AND MAIL THE COUPON NOW! Get my big 64-page FREE BOOK on the opportunities in Radio. Read how quickly you can learn at home in your spare time to be a Radio Expert—what good jobs my graduates have been getting—real jobs with real futures.

Real Opportunities Ahead In Radio for Trained Men

It's hard to find a field with more opportunities awaiting the trained man. Why in 1934 the Radio industry sold $235,000,000 worth of sets and parts! Over 300,000 people worked in the industry! It's a gigantic business, even in the poor business years. And look what's ahead! Millions of sets are going out of date annually. 20,000,000 sets are now in operation on which over $100,000,000 are spent EACH YEAR for repairs, servicing, new tubes, etc. Broadcasting stations pay their employees (exclusive of artists) approximately $23,000,000 a year. Advertisers pay 600 great Broadcasting Stations over $75,000,000 a year for Radio time and talent. A few hundred jobs that paid $30, $50, $75 a week less than 20 years ago have grown to thousands. These figures are so big that they're hard to grasp. Yet they're all TRUE! Here's a new industry that has grown to be a commercial giant! No wonder business leaders predict a brilliant future for the great and growing Radio industry.

Get Into This Field With a Future

There's opportunity for you in Radio. Its future is certain. Short wave, police Radio, automobile Radio, loud speaker systems, aviation Radio, marine Radio—in every branch developments and improvements are taking place. Here is a real future for additional thousands of trained men who really know Radio. And Television—another Radio development—promises many good jobs soon. One million dollars is now being spent on two stations, and receiving sets are being designed and built. New opportunities are right ahead. Get the Training that opens the road to good pay and success! Send me the Coupon NOW—and get full particulars on how easy and interesting I make learning at home. Read the letters from graduates who are earning real money in this fascinating industry.

Learn at Home in Your Spare Time to Be a Radio Expert

Hold your job. There is no need for you to leave home. I will train you quickly and inexpensively in your spare time. You don't have to be a high school or college graduate. My Course is written in a clear, interesting style that most anyone can grasp. I give you practical experience under my 50-50 method of Training—one-half from Lesson Books and one-half from practical experience with equipment I give you. This unique and practical method has been called one of the greatest developments in home study Radio training.

Here's Proof

Best Equipped Shop in Town

"In the last yaar we have movad our Radio shop and we now hare the best equipped Radio Repair Shop in East Toledo. We also have a shop at 624 Milton Street. We have three fellows working for us."—W. H. Brown, 309 Main St., Toledo, Ohio.

$15 a Week in Spare Time

"My spare time earnings average $15 a week. Since studying with you I hava earned about $7,000 to $8,000 in Radio. I owe my success to tha good method of the N. R. I."—C. N. Heffelfinger, R. F. D. No. 1, Temple, Pa.

Now Has Fine Business

"I have a fine business servicing sets. I am making a good living—seldom have a week under $40. If it wasn't for N. R. I., I would probably be tramping the streets."—Glenn C. King, 46 Division Ave., S., Grand Rapids, Mich.

Get the Facts about THE TESTED WAY

MAKE MORE MONEY

Loud Speakers
Making, installing, servicing Loud Speakers are money making jobs for men with Radio training.

Broadcasting Stations
Employ managers, engineers, operators, installation and maintenance men for jobs paying up to $5,000 a year.

AS RADIO EXPERTS

Set Servicing
Spare time set servicing pays many N.R.I. men $200 to $1,000 a year. Full time men make as much as $30, $50, $75 a week.

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

My big 64-page book gives proof that many make $5, $10, $15 a week extra servicing sets in their spare time soon after enrolling. I give you plans and ideas that have made good spare time money—$200 to $1000 a year—for hundreds of fellows. My Course is famous as "the one that pays for itself."

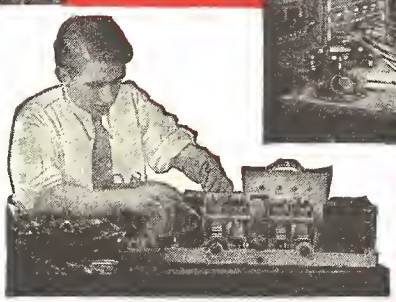
Money Back If Not Satisfied

I am so sure that N. R. I. can train you at home satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lesson and Instruction Service upon completing your Course. You'll get a copy of this agreement with my Book.

64-Page Book Free

Get your copy TODAY. It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time job opportunities; it tells you about my Course; what others who have taken it are doing and making. Find out what Radio OFFERS YOU—without the slightest obligation. MAIL THE COUPON in an envelope, or paste it on a penny postcard NOW.

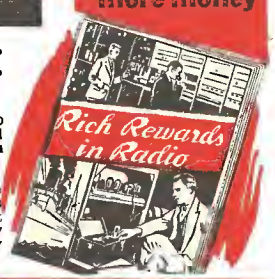
J. E. SMITH, President
National Radio Institute
Dept. 5NH, Washington, D. C.



I have helped hundreds of men make more money

You Get PRACTICAL EXPERIENCE with Radio Equipment I Give You

I'll show you how to use my special Radio Equipment for conducting experiments and building circuits used in such well-known sets as Westinghouse, General Electric, Philco, R. C. A.-Victor, Atwater Kent and others. You work out with your own hands many of the things you read in our lesson books. This 50-50 method of training makes learning at home easy, interesting, fascinating, intensely practical. You learn how sets work, why they work, and how to make them work.



MAIL TODAY FOR FREE 64 PAGE BOOK

J. E. SMITH, President
National Radio Institute, Dept. 5NH,
Washington, D. C.

Dear Mr. Smith: Without obligating me, send free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please write plainly.)

NAME ..... AGE .....

ADDRESS .....

CITY ..... STATE .....

TO BETTER PAY Now

TEST *Yourself*

How many of these questions about automobiles can you answer correctly?

1. How can you make your car ride safer at high speeds?
2. Do modern engines run at higher or lower winter temperatures than the old ones?
3. What should you be careful of when inflating front tires?
4. Why was last winter a severe test of anti-freezes?
5. What is the best way to drive out of deep mud or snow?
6. How can you find out how much anti-freeze your car requires for protection in zero weather?

ANSWERS

1. Have pressure in front tires a few pounds higher than the rear.
2. Modern engines run at much *higher* winter temperatures.
3. Be sure both tires carry the same pressure. Uneven inflation causes shimmy and hard steering.
4. The weather was as changeable as a see-saw. Warm one day . . . cold the next. Ordinary "cheap" anti-freezes boiled away during warm spells and didn't give protection when freezing weather returned. Eveready Prestone won't boil off or evaporate no matter how changeable the weather.
5. *Back* out, if possible. This pulls rear wheels *up* and out. Going forward tends to push wheels in deeper.
6. Turn to Page 19 and find *your* car on the chart. It shows how little—at the new low price—it will cost to have *guaranteed* Eveready Prestone protection in your car this winter.

SPECIAL OFFER...A "Weather Wheel" which will help you to forecast the weather. Also "Weather as a Hobby"—a 48-page illustrated book, prepared by weather experts. Full of fascinating weather facts. Send 10c (stamps or coin) to National Carbon Co., Inc., P. O. Box 600-2G, Grand Central Station, New York, N. Y.

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GILBERT BOY CHEMISTS LEAD IN THRILLING SCIENTIFIC DISCOVERIES

HOW YOU CAN MAKE MYSTERIOUS COMPOUNDS GIVE UP THEIR SECRETS WITH A

GILBERT CHEMISTRY SET

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A frank man to PATENTS-INVENTIONS

THE world of invention moves on. The Patent Office clerk who resigned his job back in 1833, because he said there was nothing left to invent, now stands out as one of the funniest men in American History. Think of everything that's happened in the last 100 years! Why, only recently the papers carried a notice that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new, non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

Remember this: For every outstanding big invention there are thousands of small, simple things for use in the home, the office, the factory, on the farm, on every sort of travel conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop.

Many Little Ideas Have Big Commercial Possibilities

A person finds something he's using doesn't work right, or it's clumsy, or costs too much. He gets a happy thought. He improves the old Article. That's contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things millions of us use didn't come from the brains of engineers and physicists. They came from the mind and maybe the crude home work bench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance or circumstance has given him to do. The "little" man's opportunity as an inventor was never greater than it is today.

Who Are Inventors?

You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves inventors at all. During their work or leisure they get an idea. They work it out on paper. They get in touch with us about Protection. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old-fashioned straight hair pin to make it stay in place? **Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.**

Can You Answer These Questions?

Ask yourself these questions: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the *first* man to think of *my invention?* Is a Patent worth the cost? Do I need a model? Should I try to sell my invention before I have it Patented? Is there any safe, business-like way to secure financial help? If I do apply for a Patent, how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been patented? These are but a few of the questions which usually confront the average man. You need the answers! **YOU CAN HAVE THEM,** without cost, trouble, or delay.

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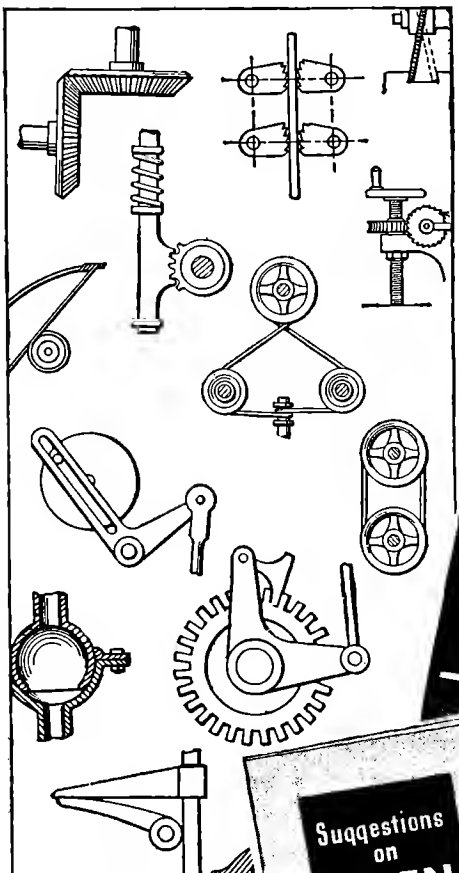

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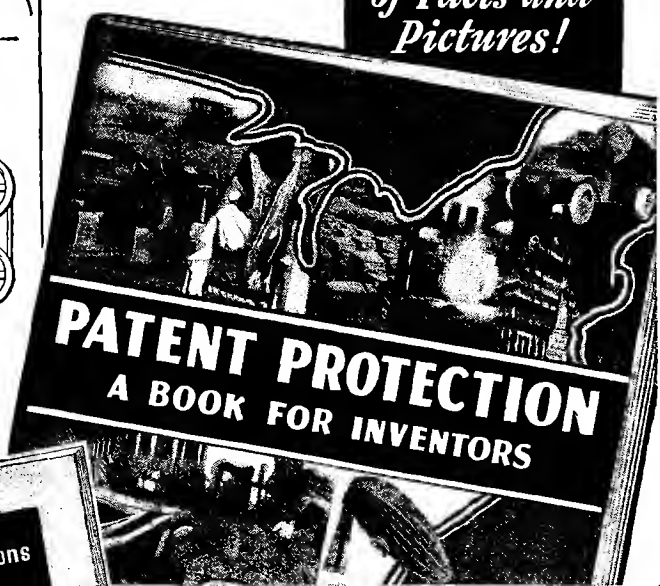

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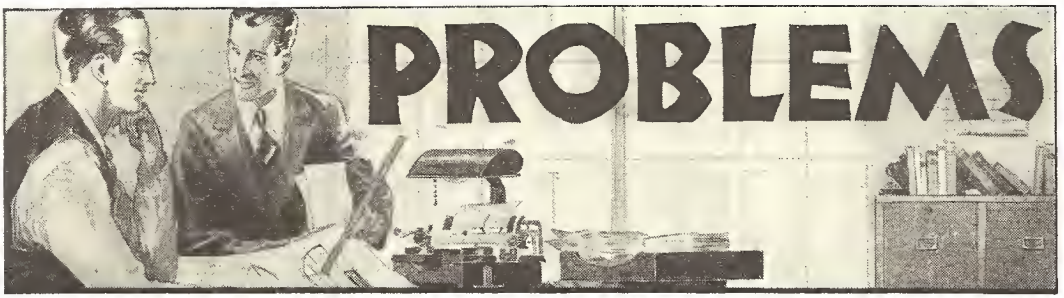

MM's Advisory Experts Offer Free Information

COUNTING METER DISC REVOLUTIONS

How can an electric meter be used to measure the wattages of different appliances in the home? —L. S., Valley, Wash.

With all lights and equipment other than that under test turned off, count the number of revolutions of the disc inside the meter for one minute. Since each type of meter has a different constant, call the meter department of your power company and ask how many turns of the disc per minute represent a current drain of one watt for your meter. Meters cannot be tested by turning on a certain number of lights and counting in this manner, as the ratings of light bulbs are not always correct.—*L. J. Markus, Electrical Engineer.*

TWO BATHS AT 47 M. P. H.

I launched my version of *Wink,* with a converted Ford V-8 motor, this summer. We taxied around a bit, turned up the motor, then opened her up. I stop-watched a measured mile at 47 miles an hour, then swerved the wheel a bit and over we went. We righted the boat, bailed out, then tried again, wide open, straight down the river, only to get another spill. I have one of the fastest and most beautiful inboards in the middle west—please tell me how to make it a little safer.—W. L. H., Cedar Rapids, Ia.

Your engine has a much higher center of gravity than that for which your speedboat was designed. As a remedy I would suggest the addition of chine strips on each side of the hull aft and a reduction in the length of the rudder. Always consult the designer before making any changes in the speed boat plan which might affect the balance.—*Sam Rabl, Naval Architect.*

STAMPS MUST STAY CANCELLED

Where could I get an ink remover that would take the cancellation off a stamp without injuring the design? My stamp collection would look better if every stamp were clean.—E. B., New Knoxville, Ohio.

Since very nearly the same ink is used to cancel a stamp as to print it, the removal of the cancellation alone is a difficult if not impossible problem. Federal regulations prohibit the removal of cancellations from U. S. postage stamps.

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AN HISTORIC CHECK

I have the original check used by Wiley Post to pay Harold Gatty for his services on their round-the-world flight in 1931. Of course, it bears both their signatures. Can you give me an estimate as to its value?—G. C. M., Royston, Ga.

Since there can be only one authentic check like yours in existence, its value is theoretically an infinite sum. The sale value is another thing, and depends entirely upon your ability to contact a purchaser. The Problems Editor will send the address of G. C. M. to any interested reader, or will forward letters to him.

GOOD LENSES HAVE BUBBLES

Do bubbles of air in a camera lens indicate poor quality?—J. R. V., New York, N. Y.

A few air bubbles do not interfere with the performance of a camera lens. The finest optical glass, Jena glass, cannot be made without some air bubbles.

(Editor's Note: Your questions on any problem will be answered personally and free of charge by MM experts if a stamped addressed envelope or reply card is enclosed. Address Problems Editor, Modern Mechanix Publishing Co., Minneapolis, Minn.)

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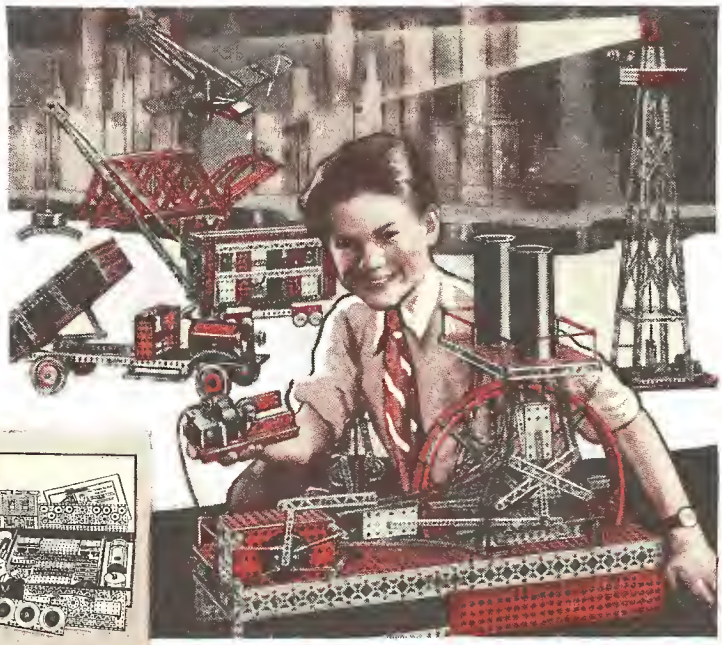

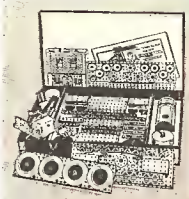

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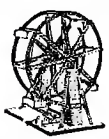

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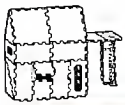

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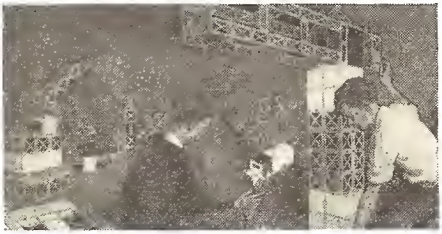

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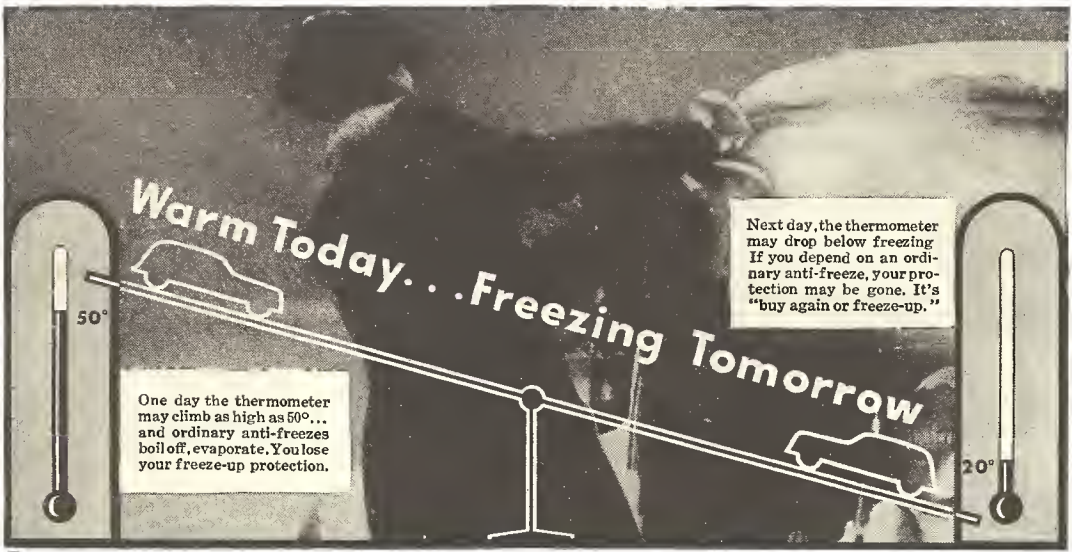

Warm Today. . . Freezing Tomorrow
50°
20°
One day the thermometer may climb as high as 50°... and ordinary anti-freezes boil off, evaporate. You lose your freeze-up protection.
Next day, the thermometer may drop below freezing If you depend on an ordinary anti-freeze, your protection may be gone. It's "buy again or freeze-up."

Put in EVEREADY PRESTONE

the GUARANTEED* ANTI-FREEZE

One shot, put in now, will guard your car against freeze-up and rust all winter. Eveready Prestone won't boil off no matter how warm the weather gets between the cold snaps. Has no odor. Specifically guaranteed.

UCC

Unit of Union Carbide and Carbon Corporation

Ask Your Dealer This One Question

Of more than 100 brands of anti-freeze on the market, most are based on alcohol—but are not plainly labeled as such. So ask your dealer this question about any anti-freeze you consider buying: "*How much* of this product is alcohol?" That is important, for alcohol, no matter how disguised or what it is called, is subject to evaporation, leaving you without adequate protection.

Your dealer will tell you that Eveready Prestone contains no glycerine, no alcohol . . . and *that it will not* boil off or evaporate. Back of every drop of Eveready Prestone is the following guarantee . . . your definite assurance of *all-winter* protection.

*A DEFINITE GUARANTEE

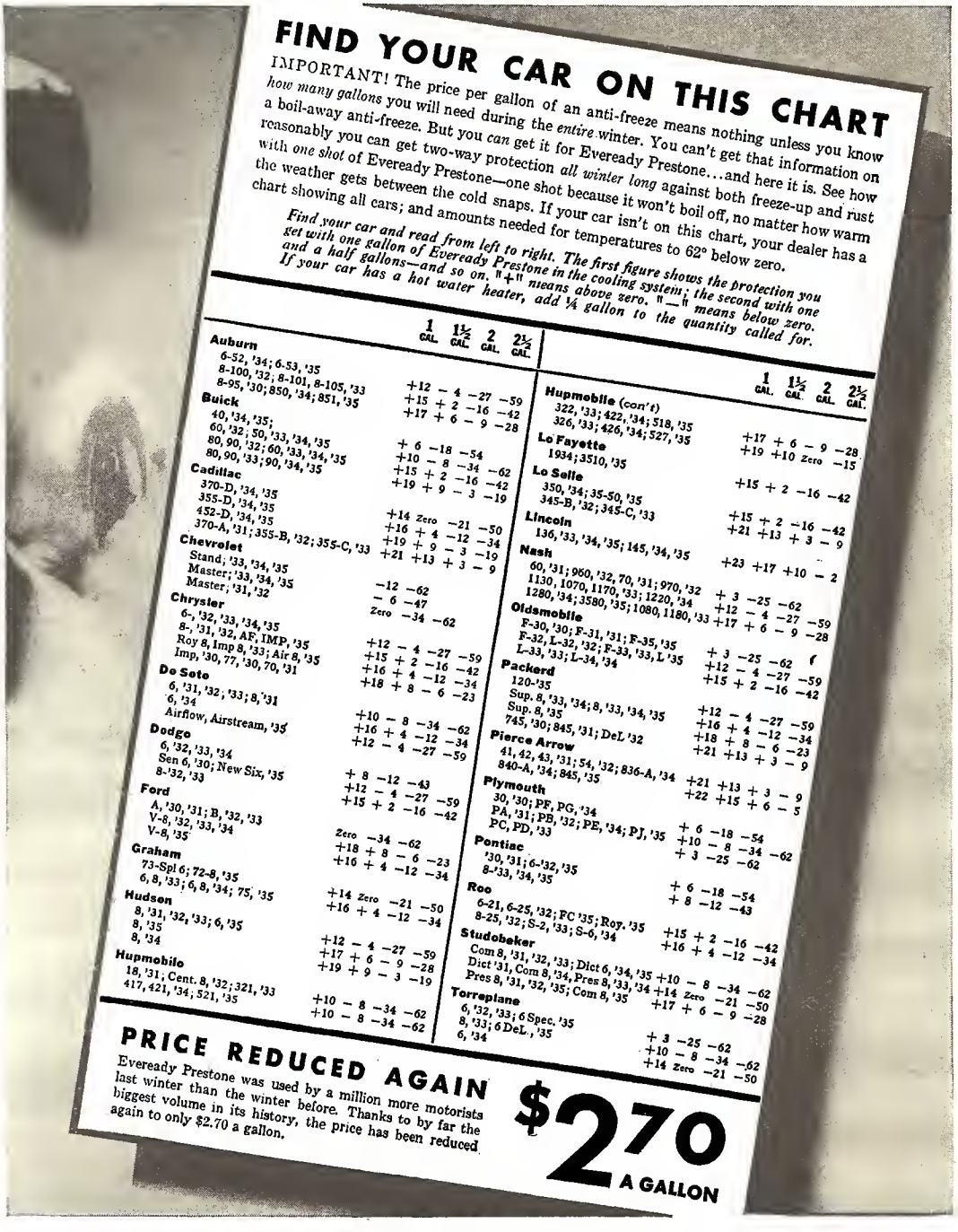
"National Carbon Company, Inc., specifically guarantees that Eveready Prestone, if used according to printed directions, in normal water cooling systems, will protect the cooling system of your car against freezing and clogging from rust formations for a full winter, also that it will not boil away, will not cause damage to car finish, or to the metal or rubber parts of the cooling system, and that it will not leak out of a cooling system tight enough to hold water."

Special Offer . . . A "Weather Wheel" which will help you to forecast the weather Also "Weather as a Hobby"—a 48-page illustrated book, prepared by weather experts. Full of fascinating weather facts. Send 10c (stamps or coin) to National Carbon Co., Inc., Box 600, Grand Central Station, New York, N. Y

Name_____

Address_____ (MM&I—12)

THE WINTER SEE-SAW



FIND YOUR CAR ON THIS CHART

IMPORTANT! The price per gallon of an anti-freeze means nothing unless you know *how many gallons* you will need during the *entire* winter. You can't get that information on a boil-away anti-freeze. But you *can* get it for Eveready Prestone...and here it is. See how reasonably you can get two-way protection *all winter long* against both freeze-up and rust with *one shot* of Eveready Prestone—one shot because it won't boil off, no matter how warm the weather gets between the cold snaps. If your car isn't on this chart, your dealer has a chart showing all cars; and amounts needed for temperatures to 62° below zero.

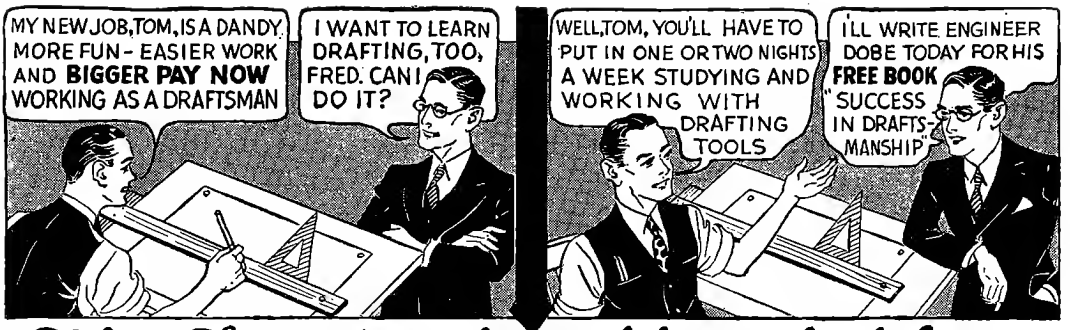
Find your car and read from left to right. The first figure shows the protection you get with one gallon of Eveready Prestone in the cooling system; the second with one and a half gallons—and so on. "+" means above zero. "—" means below zero. If your car has a hot water heater, add ¼ gallon to the quantity called for.

	1 GAL.	1½ GAL.	2 GAL.	2½ GAL.
Auburn				
6-52, '34; 6-53, '35	+12	− 4	−27	−59
8-100, '32; 8-101, 8-105, '33	+15	+ 2	−16	−42
8-95, '30; 850, '34; 851, '35	+17	+ 6	− 9	−28
Buick				
40, '34, '35;	+ 6	−18	−54	
60, '32; 50, '33, '34, '35	+10	− 8	−34	−62
80, 90, '32; 60, '33, '34, '35	+15	+ 2	−16	−42
80, 90, '33; 90, '34, '35	+19	+ 9	− 3	−19
Cadillac				
370-D, '34, '35				
355-D, '34, '35	+14	Zero	−21	−50
452-D, '34, '35	+16	+ 4	−12	−34
370-A, '31; 355-B, '32; 355-C, '33	+19	+ 9	− 3	−19
Chevrolet	+21	+13	+ 3	− 9
Stand, '33, '34, '35				
Master; '33, '34, '35	−12	−62		
Master; '31, '32	− 6	−47		
Chrysler	Zero	−34	−62	
6-, '32, '33, '34, '35				
8-, '31, '32, AF, IMP, '35	+12	− 4	−27	−59
Roy 8, Imp 8, '33; Air 8, '35	+15	+ 2	−16	−42
Imp, '30, 77, '30, 70, '31	+16	+ 4	−12	−34
De Soto	+18	+ 8	− 6	−23
6, '31, '32; '33; 8, '31				
6, '34	+10	− 8	−34	−62
Airflow, Airstream, '35	+16	+ 4	−12	−34
Dodge	+12	− 4	−27	−59
6, '32, '33, '34				
Sen 6, '30; New Six, '35	+ 8	−12	−43	
8-'32, '33	+12	− 4	−27	−59
Ford	+15	+ 2	−16	−42
A, '30, '31; B, '32, '33				
V-8, '32, '33, '34	Zero	−34	−62	
V-8, '35	+18	+ 8	− 6	−23
Graham	+16	+ 4	−12	−34
73-Spl 6; 72-8, '35				
6, 8, '33; 6, 8, '34; 75, '35	+14	Zero	−21	−50
Hudson	+16	+ 4	−12	−34
8, '31, '32, '33; 6, '35				
8, '35	+12	− 4	−27	−59
8, '34	+17	+ 6	− 9	−28
Hupmobile	+19	+ 9	− 3	−19
18, '31; Cent. 8, '32; 321, '33				
417, 421, '34; 521, '35	+10	− 8	−34	−62
	+10	− 8	−34	−62
Hupmobile (con't)				
322, '33; 422, '34; 518, '35	+17	+ 6	− 9	−28
326, '33; 426, '34; 527, '35	+19	+10	Zero	−15
Le Fayette				
1934; 3510, '35	+15	+ 2	−16	−42
Le Salle				
350, '34; 35-50, '35				
345-B, '32; 345-C, '33	+15	+ 2	−16	−42
Lincoln	+21	+13	+ 3	− 9
136, '33, '34, '35; 145, '34, '35				
Nash	+23	+17	+10	− 2
60, '31; 960, '32, 70, '31; 970, '32	+ 3	−25	−62	
1130, 1070, 1170, '33; 1220, '34	+12	− 4	−27	−59
1280, '34; 3580, '35; 1080, 1180, '33	+17	+ 6	− 9	−28
Oldsmobile				
F-30, '30; F-31, '31; F-35, '35	+ 3	−25	−62	
F-32, L-32, '32; F-33, '33, L '35	+12	− 4	−27	−59
L-33, '33; L-34, '34	+15	+ 2	−16	−42
Packard				
120-'35				
Sup. 8, '33, '34; 8, '33, '34, '35	+12	− 4	−27	−59
Sup. 8, '35	+16	+ 4	−12	−34
745, '30; 845, '31; DeL '32	+18	+ 8	− 6	−23
Pierce Arrow	+21	+13	+ 3	− 9
41, 42, 43, '31; 54, '32; 836-A, '34				
840-A, '34; 845, '35	+21	+13	+ 3	− 9
Plymouth	+22	+15	+ 6	− 5
30, '30; PF, PG, '34				
PA, '31; PB, '32; PE, '34; PJ, '35	+ 6	−18	−54	
PC, PD, '33	+10	− 8	−34	−62
Pontiac	+ 3	−25	−62	
'30, '31; 6-'32, '35				
8-'33, '34, '35	+ 6	−18	−54	
Roo	+ 8	−12	−43	
6-21, 6-25, '32; FC '35; Roy. '35				
8-25, '32; S-2, '33; S-6, '34	+15	+ 2	−16	−42
Studebeker	+16	+ 4	−12	−34
Com 8, '31, '32, '33; Dict 6, '34, '35	+10	− 8	−34	−62
Dict '31, Com 8, '34, Pres 8, '33, '34	+14	Zero	−21	−50
Pres 8, '31, '32, '35; Com 8, '35	+17	+ 6	− 9	−28
Torreplane				
6, '32, '33; 6 Spec. '35	+ 3	−25	−62	
8, '33; 6 DeL., '35	+10	− 8	−34	−62
6, '34	+14	Zero	−21	−50

PRICE REDUCED AGAIN

Eveready Prestone was used by a million more motorists last winter than the winter before. Thanks to by far the biggest volume in its history, the price has been reduced again to only $2.70 a gallon.

$2.70 A GALLON


MY NEW JOB, TOM, IS A DANDY. MORE FUN - EASIER WORK AND BIGGER PAY NOW WORKING AS A DRAFTSMAN
I WANT TO LEARN DRAFTING, TOO, FRED. CAN I DO IT?
WELL, TOM, YOU'LL HAVE TO PUT IN ONE OR TWO NIGHTS A WEEK STUDYING AND WORKING WITH DRAFTING TOOLS
I'LL WRITE ENGINEER DOBE TODAY FOR HIS FREE BOOK "SUCCESS IN DRAFTSMANSHIP"

Then Tom, too, learned by mail at home

An assumed case illustrated.

THE boom in building and other industries now seems well on the way!

Who is always needed first of all? The draftsman who draws the plans. *After* that, the steel mills, lumber mills, brickyards and others make their sales.

Government efforts to help are making things hum. In one factory town, a shortage of draftsmen is already reported. Many trained draftsmen will be needed—at better pay and shorter hours.

Who'll get those good jobs? Of course, the men who have prepared—so, prepare now!

Better Jobs Now

are ready and more expected soon in auto work, aviation, electricity, machinery and certain building lines.

For those who learn drafting now!

It's the way for a quick start to a better paying, much bigger job. Send *at once* for Engineer Dobe's Book.

Free Book

HERE is an opportunity that's open to those who know how to grasp it:—

At a few dollars a month, students get complete training in drafting by mail in surprisingly few months—Engineer Dobe teaches his students until thoroughly trained and until placed in a good paying job. Trained Draftsmen enjoy good salaries. If you don't get a satisfactory job:—all your money back. That's Engineer Dobe's guarantee.

With Engineer Dobe's method no previous experience is necessary. High School education not needed. Everything made plain. Practical work right from the start until you're in position.

If you're a mechanic, a knowledge of draftsmanship may make you a superintendent in short order. Get out of overalls and draw the pay of a boss. If you ***are*** a boss, learn draftsmanship; a ***foundation*** stone of many a line of business.

In every walk of life, practical training in draftsmanship will prove valuable. Even if you never accept a job as a draftsman, will you not be ***money ahead*** by taking Engineer Dobe's course?

You'll be amazed at the speed with which you can learn in your spare time by Engineer Dobe's ***practical method.*** Send coupon TODAY for free book entitled "Success in Draftsmanship".

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DRAFTING

FROM AN ENGINEER

LEARN BY MAIL AT HOME

Time is money. Learn drafting in your spare time. It's high time now to prepare. Don't wait another day. ***Send coupon for Dobe's free book.***

Outfit 20x25 in.

These TOOLS *and Other* EQUIPMENT *Given When You Start*

For 34 years (since 1900) Engineer Dobe has taught drafting by mail. Thousands of students, aged 16 and 18 to past 50, have won SUCCESS!

Here's a valuable set of tools—sent *at once* (also a drawing table), all without extra charge the day you enroll.

Write NOW while this offer lasts.

ENGINEER DOBE, Div. 47-39, Libertyville, Ill.

Send me your free book, "Successful Draftsmanmanship" and please explain how you assist your graduates to good positions as draftsmen.

Name _____

Address _____

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State _____ *Age* _____

ENGINEER DOBE, Division 47-39 **Libertyville, Ill.**

BIG MUSCLES — SMASHING STRENGTH GLOWING HEALTH!

I'll Prove in the first 7 days — that I can Make You a New Man!

DO YOU want big, smashing, sledge-hammer muscles all over your body? Husky, broad shoulders? A deep, powerful chest? All the pep and vigor of a "hard as nails" athlete?

Give me just 7 days—one short week. That's all I need to give you the PROOF that I can make you a *new man*—give you a real he-man build and glowing health that resists sickness, ends pimples, skin blemishes, constipation and other troubles.

Read the reports below from just a few of the hundreds of fellows whose bodies I have made over. That's the kind of RESULTS *you* can get with my discovery—*Dynamic Tension*. My free book. "Everlasting Health and Strength," tells how I can give YOU a body that women will admire and men will envy.

THIS STERLING SILVER CUP BEING GIVEN AWAY

This valuable cup, made of solid sterling silver, stands about 14 inches high on a black mahogany base.

I will award it to my pupil who makes the most improvement in his development within the next three months. Therefore, no matter what your measurements may be now, you have an *equal chance* to win this cup for *permanent* possession—and with YOUR name engraved on it!

The 97-lb. Weakling Who Became "The World's Most Perfectly Developed Man"

LOOK at this new photo of me. This is *exactly* how I look today. Yet once *I* was a soft, skinny, 97-lb. weakling! I always felt timid, self-conscious—never had good times—couldn't eat a square meal and feel well afterward. Then I discovered the secret of *Dynamic Tension*—my entirely new and different method of body-building. It changed my entire life—gave me the body you see here. It has twice won for me the title, "The World's Most Perfectly Developed Man"! And what my amazing system did for *me*—what it has done for hundreds of *other* fellows like yourself—it can now do for YOU, too!

I back up that promise with RESULTS—*quick* RESULTS. You begin to SEE and FEEL the difference at once. What's more, it's actual *fun* to build a husky body my *Dynamic Tension* way, at home, in just a few minutes of your spare time daily. And you don't have to buy any contraptions or gadgets that might strain your heart or other vital organs.

Mail Coupon for My Big 48-Page Book — FREE!

Make me PROVE, in just 7 days, that I CAN give you the big, smashing muscles—powerful shoulders—deep chest—and glowing, *all 'round* health you have always wanted. Take the first step *today*. Mail coupon for your FREE copy of my big Book, "Everlasting Health and Strength." Address me *personally*. I'll send you the book by return mail. Show me you're a man of *action*. Do it NOW!

CHARLES ATLAS, Dept. 612, 115 East 23rd Street, New York City.

Puts FIVE INCHES on Chest!

"Chest gained over five inches; arms over two inches. Nervous trouble and constipation gone. Have gained ten pounds. Feel like a new man."—George Tobias Finkbone, West Middletown, Ohio.

Health 100% Better

"Benefits wonderful! First week my arm increased one in., chest two in. Health 100% better."—William Easton, Cincinnati, Ohio.

Gains 20 lbs.!

"Gained twenty lbs. Biceps, 15 3-4 inches and large powerful shoulders. Rest of my body well proportioned and hard as rock."—Howard Sibley, Wichita, Kans.

Results in ONE WEEK!

"Just a week ago I started. What a difference already! Before, my chest was 32 in. normal and 36 expanded. Now it's 35 1-2 in. normal and 38 1-2 expanded!"—Frank Segretto, Yonkers, N. Y.

Get this FREE BOOK!

CHARLES ATLAS, Dept. 612
115 East 23rd Street, New York City

I want the proof that your system of *Dynamic Tension* will make a New Man of me—give me a healthy, husky body and big muscle development. Send me your free book, "Everlasting Health and Strength."

Name .....
(Please print or write plainly)

Address .....

City .....State .....

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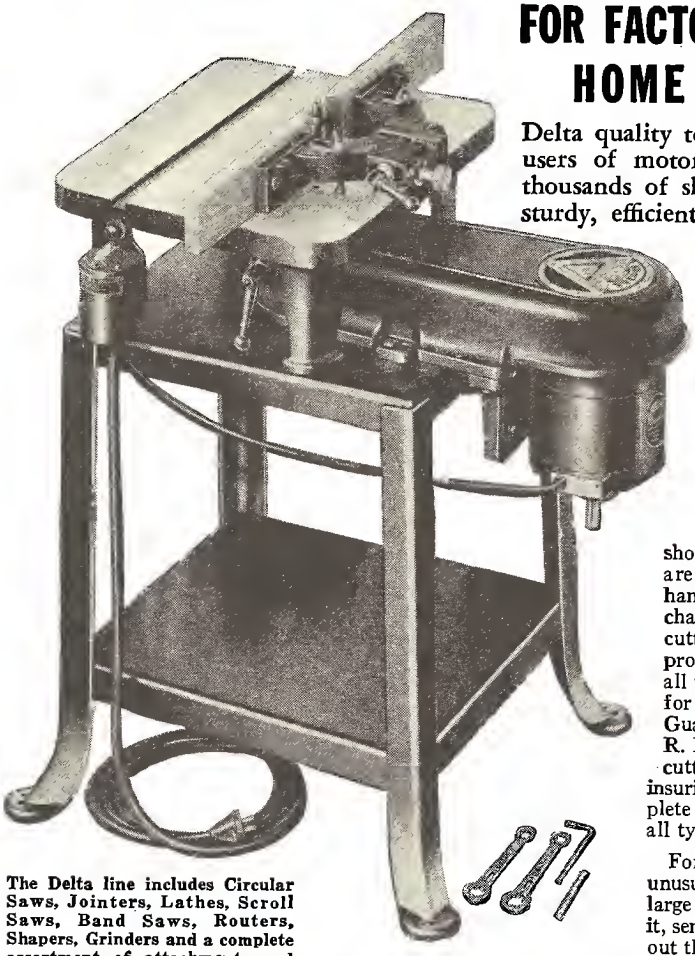
NEW MOTOR-DRIVEN TOOLS

FOR FACTORIES, SMALL SHOPS, HOME WORKSHOPS . . .

Delta quality tools have brought a new era to users of motor driven equipment in tens of thousands of shops all over the world. These sturdy, efficient, motor-driven tools are saving time, money and labor for their users. Delta tools are built to stand heavy strain of continuous production work.

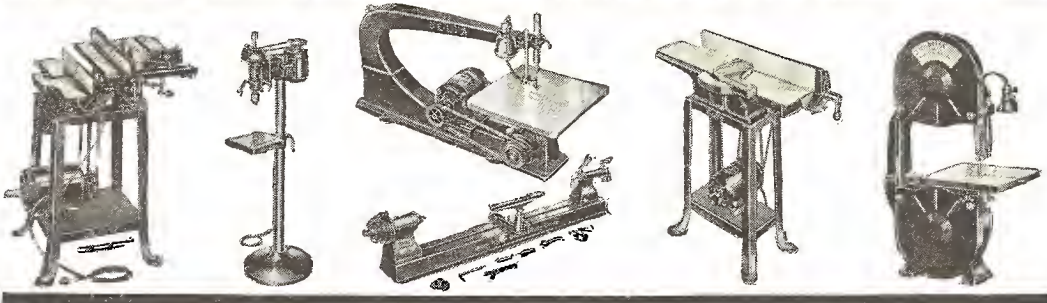


The Delta line includes Circular Saws, Jointers, Lathes, Scroll Saws, Band Saws, Routers, Shapers, Grinders and a complete assortment of attachments and accessories.

New DELTA SHAPER UNIT

here illustrated is one of the simplest and at the same time most complete Shapers ever designed for the workshop. Some of its important basic features are: **1.** Extra Large Table permitting the handling of large work with ease; **2.** Interchangeable Spindles for $\frac{5}{16}$" and $\frac{1}{2}$" hole cutters for various types of work; **3.** Improved Completely Adjustable Fence for all varieties of straight work; starting pin for curved work of all kinds; **4.** Complete Guarding system; **5.** High Speed of 10,000 R. P. M. which with standard 3-lip Delta cutter gives over 30,000 cuts a minute, thus insuring smooth and finished work; **6.** Complete range of cabinet and sash cutters for all types of mill work.

For full details and description of this unusual tool together with illustrations of large variety of work that can be done with it, send for the new 1936 Delta Catalog. Fill out the coupon on the second page following this and mail to today!



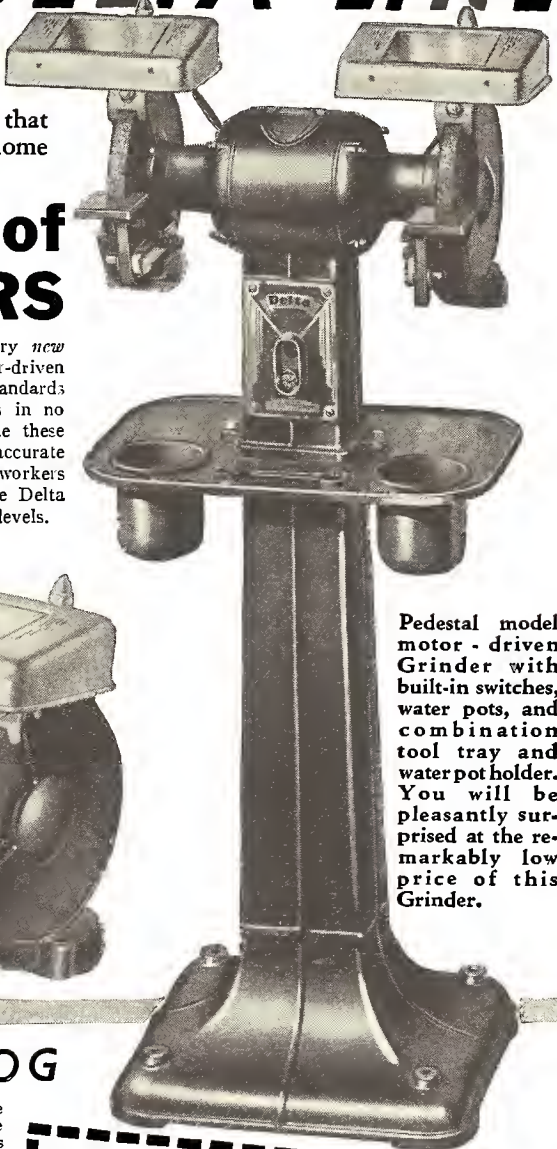
Delta QUALITY represents real ECONOMY

IN 1936 "DELTA" LINE

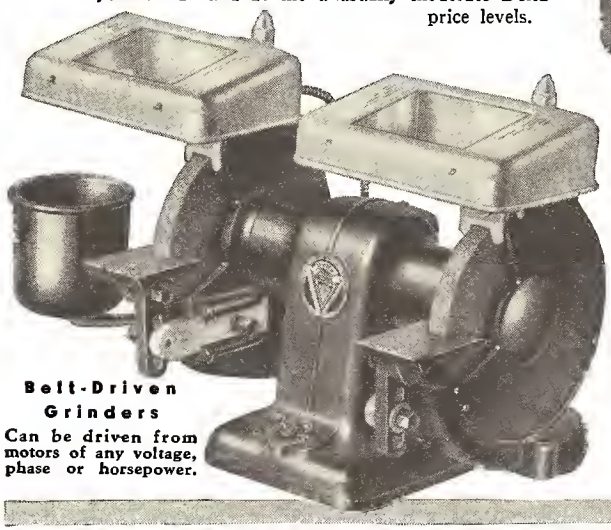
They are being used by some of the largest manufacturers in the country because of of their accuracy, quality construction, and flexibility. Yet their initial cost is so low that they are well within the reach of even the home workshop owner.

Complete line of NEW GRINDERS

Not just another line of grinders—but revolutionary *new* grinders in every sense of the word! Belt-driven, motor-driven and pedestal models—they all embody Delta's high standards of design and construction. Many unusual features in no other grinders. No pains have been spared to make these new Delta Tools *ideal* in every way—convenient, safe, accurate and efficient—truly, here are the grinders that shopworkers have always wanted—and at the unusually moderate Delta price levels.



Pedestal model motor - driven Grinder with built-in switches, water pots, and combination tool tray and water pot holder. You will be pleasantly surprised at the remarkably low price of this Grinder.



Belt-Driven Grinders

Can be driven from motors of any voltage, phase or horsepower.

Write for Latest CATALOG

It is crowded with photographs and information about the new line of 1936 Delta tools. It contains much valuable information that every man interested in wood-working tools should have. It shows how Delta tools are built to stand the grind of production work and yet are so low priced as to be within the reach of all, how they save time, money and labor —and quickly pay for themselves.

Mail coupon without delay. Enclose only 10 cents at same time for Book of Practical Delta Projects, 32 pages of new and novel things to make, with numerous blue prints, working drawings, photographs and illustrations—and complete directions.

DELTA MFG. CO.

600-634 E. VIENNA AVE.

MILWAUKEE WIS.

DELTA MANUFACTURING COMPANY,
600-634 E. Vienna Ave., Dept. M1235
MILWAUKEE, WISCONSIN

I enclose 10c (stamps or coin), for which please send me one copy of "Practical Delta Projects." Also place me on your mailing list to receive 1936 Delta catalog of quality motor-driven wood-working tools.

Name..... Age.....

Address.....

City..... State.....

☐ Check here if you are a Delta user now.

Random Chips from

Beauty and the unusual are combined in this daylight photo of lightning striking the surface of a lake. F. George Roesch, of Syracuse, N. Y., snapped the scene in daylight with shutter open at stop 64. He won third prize, $2.00.

INVENTORS—here's something for you. The International Society of Modern Mechanix and Inventors is being opened to individual inventors. Since its organization, the society has chartered only groups of five or more persons that had formed clubs.

Individuals, however, who worked alone or were not interested in group affairs, have continually expressed a desire for membership. The directors of the society bowed to their wishes and have prepared special membership certificates for inventors.

The membership does not cost anything. The only requirements are that you be a subscriber to MM and have been granted a patent, have applied for a patent, or at least have ordered a search of patent files. Satisfactory proof is all that is required.

When the inventor membership grows sufficiently large, the society expects to conduct a special contest for inventors only. Write now to MM for full information regarding membership certificates.

Groups interested in any of the hobbies covered in MM are eligible as member clubs of the Society. Write to MM for information on getting a charter.

Mr. E. Liddycoat walked off with the $5.00 first prize check this month by sending the Workbench a photo of his air drive sled and this letter:

Hamilton, Ont.

Dear Editor:

I am sending you a picture of our motor sleigh. The body is built of ash strips covered with sugar bags and doped up with paint. Galvanized iron-sheathed skiis are used with angle iron on the bottom to help in steering and to stop skidding.

We used a Chevrolet motor with the pistons cut off just under the piston pin to lighten them. One-eighth-inch has been taken off the block to raise the compression. A sheet iron was wrapped around the motor to keep it a little warmer. The motor swings a five-foot diameter and three-foot pitch prop about 2200 r.p.m. We estimated the speed at 80 m.p.h.

This year we took a 6-cylinder Franklin and cut it in half and inverted the three cylinders. We were told it could not be done, but it is and what's more it works.

E. Liddycoat.

There's a lot of information in that letter about air drive sleds.

* * * *

From far-off India, G. E. Townsend, of Mantunga, Bombay, writes: I have built an outboard boat and many other things from your magazine. I sail and shoot big game—tiger, panther, sambur (a deer about like your moose for size). I do a good bit of camping out and have found much advice that has been of use from your magazine.

* * * *

Returning to our contest. Second prize of $3.00 goes to Robert Cundiff and his gas-powered scooter. His letter informs us:

Riverside, Calif.

Dear Editor:

Here is a description of my gas-powered scooter:

The wheelbase is 5 feet. The scooter is powered by a ½ horsepower washing machine motor. The engine is started by pushing the scooter forward and then quickly stepping on the pedal which spins the motor over.

the Editor's Workbench

When the clutching pedal is depressed the motor is pulled forward on steel tracks. This tightens the flat belt which drives the countershaft. A motorcycle chain from the countershaft to the rear wheel drives the scooter.

Since the scooter does not exceed 15 m.p.h., both young and old can ride it anywhere with safety.

Robert Cundiff.

We can easily imagine the fun anyone can have on this neat little outfit.

* * * *

Here is Scram, not Farmer's design for liquid aqua, but air drive ice sled of E. Liddycoat that won $5.00 first prize. This year he cut a Franklin motor in half for this sled.

It is a fine policy for a magazine like yours to devote space to various kinks and processes in the amateur photography field, declares Claude Pilger of Lincoln, Neb.

* * * *

Where are the light plane plans of yesteryear in MM, asks Don Elser of Lima, Ohio? Where are the days of no state and government regulations on light planes, replies MM?

* * * *

Good news for the boat builders and the hunters, fishermen, and campers. MM is publishing two of the most worthwhile books that have ever appeared on the stands.

One, *Sportsmen's Manual,* is jammed with helpful articles written by experts on all phases of hunting,

[*Continued on page 27*]

MM's Author of the Month

An autobiography of Earl Theisen, who wrote "Filming Table Top Earthquakes" in this issue:

Who, me? I was born in the small hours of the morning of April 12, 1903. It happened in Denver's "north-side" halfway between the smelters and the stockyards.

About the same time as this blessed event, there was a lot of activity in Wyoming between the cattlemen and sheepmen. My father had a love for excitement so I soon found myself, cradle and all, roosting on the cattlemen's side of the fence. I was, however, unconcerned with the various fracases, the night raids, the burning haystacks and other forms of night entertainment indulged in by the warring factions. I was more interested in the problem of learning to walk. In this I was successful. I was then exiled to Denver and subjected to the schools.

Earl Theisen

I became a photographic addict with no interest in anything excepting an occasional meal. I taught all my friends how to do their own photographic work and during school vacation months infested the photo finishing plants.

Out of school I found employment with the Alexander Film Company who make advertising movies. Because I worked after everybody else had gone home, I was soon placed in charge of the laboratory, which at the time increased the size of my hat considerably.

While with them I got the garden variety of writing bug and turned out a number of scenarios for the company. I also wrote a number of other things which I thought was poetry.

In 1927 I found myself for some unknown reason, in Hollywood, my total capital being myself and $2.30. I found a job the next day working in the technical end of the movies. That was a long time ago!

In 1930 I quit a job doing research work for the Dunning Process Company who do the trick and effect photography for the studios to try to earn a living by my writing. Fervently, I began to investigate the semicolon, the adverb, periphrasis, and editorial slants.

I turned out over thirty articles a year for the next few years, started to work on a history of invention "Science Steps In," which will be published next year by Suttonhouse (advt.). In the meantime I also was appointed an Honorary Curator of Motion Pictures of the Los Angeles Museum, a Lectureship in Cinematography at the University of Southern California, an associate editorship, and a lot of other things that sound swell in print. I am also Chairman of the Historical Committee of the Society of Motion Picture Engineers, my job being to bring together the relics of the motion picture before it is too late. If you have any, send them to the Los Angeles Museum for preservation.

I have contributed to everything from the Encyclopedia Britannica to the "home town" paper.

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25	1085	38	734
26	1057	39	708
27	1030	40	682
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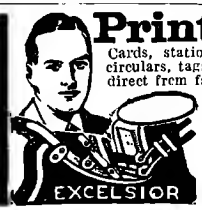

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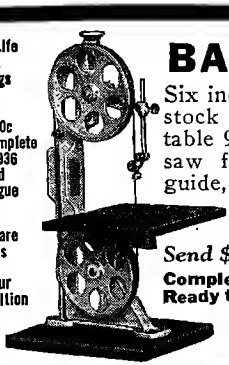

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Chips from the Editor's Workbench

[*Continued from page* 25]

This little scooter travels 15 m.p.h. and is powered by a washing machine motor. Built by Robert Cundiff, it won second prize of $3.00 in this month's Workbench contest.

fishing, and camping and tells how to build boats, canoes, and trailers.

You can get a copy for 50 cents from your news dealer or direct from MM.

For the boat builder MM has a brand new edition of the ever-popular *How To Build 20 Boats*. This edition contains plans for 20 new boats, none of which appeared in the first edition. Some of the designs have never been published before. This book will not be ready for news stand sale until the end of this month, but if you want to reserve a copy now send 50 cents direct to MM.

* * * *

Mr. Joe K. Ellsworth, research assistant at the University of California, calls our attention to an item on page 67 of the September issue which directly concerns him. We gladly pass on the additional information:

College of Agriculture,
Berkeley, Calif.

Dear Editor:

Dr. W. B. Herms and I would greatly appreciate you making some corrections of an article "Lamp Attracts, Electrocutes Flies."

We wish to inform you that the work is being done here at the University of California at Berkeley and not at the University of Southern California at Los Angeles. Incidentally, flies do not have a preference for bright orange light, but are repelled, since amber colored windows are being used in factories in order to prevent an influx of flies. The test referred to with mosquitoes was not mosquitoes at all, but the Clear Lake Gnat. The device electrocuted 1,650 gnats per second for a period of fifteen minutes. There are approximately 1,650,000 gnats to the pound, so that one can readily see the number that are electrocuted during the evening.

Joe K. Ellsworth.

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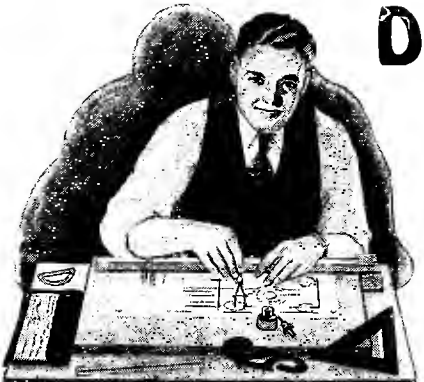

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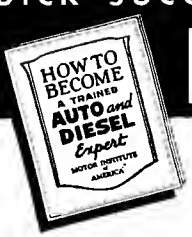

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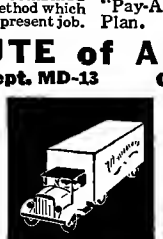

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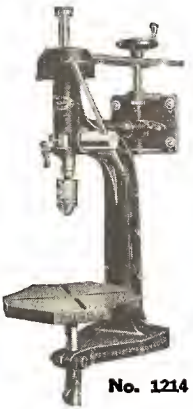

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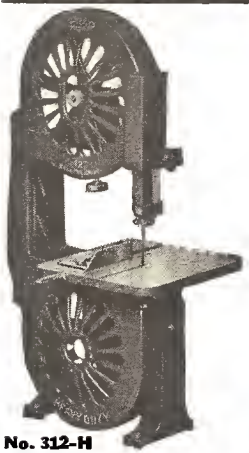
COMBINATION GRINDERS AND BUFFERS
COMBINATION GRINDERS AND SANDERS

These products are completely described in our new Catalog which will be furnished upon request.

Prices do not include motors.



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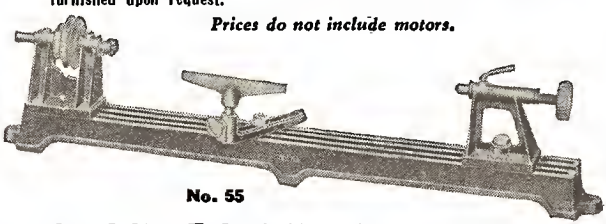

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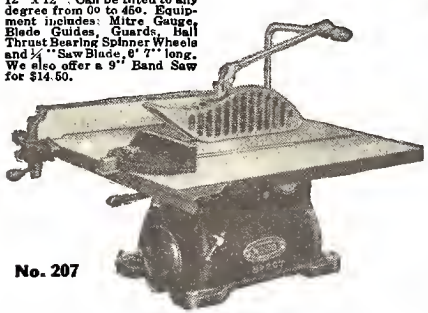

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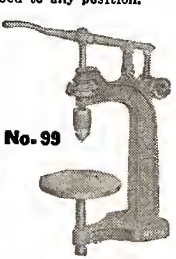

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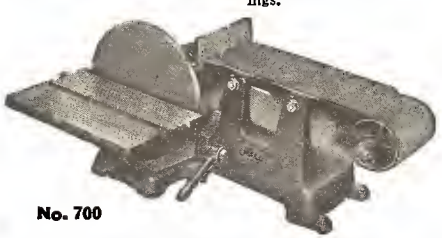
This is our Wizard-Junior Press. Height, 13½". Table, 4½". Very durable.



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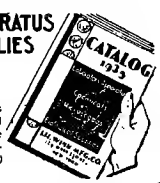

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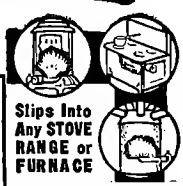

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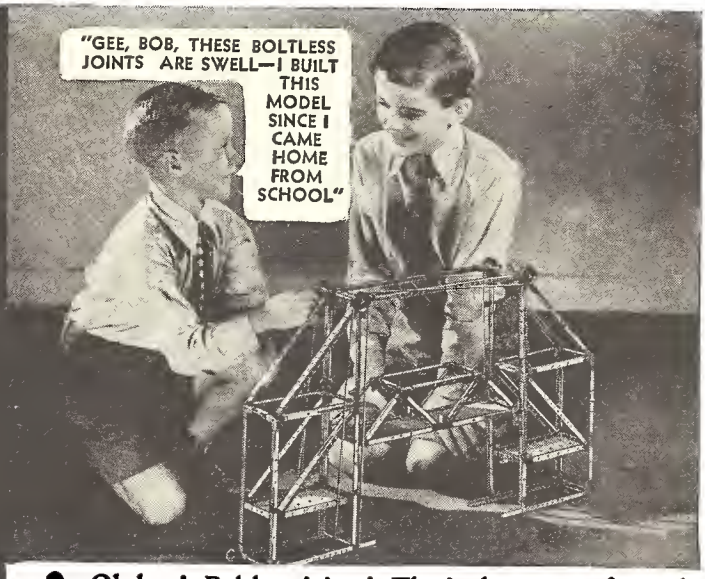

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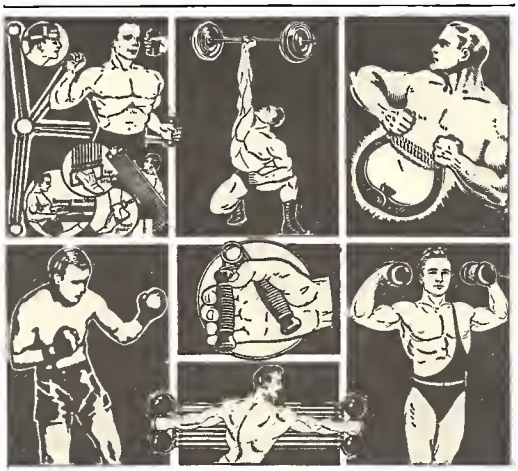

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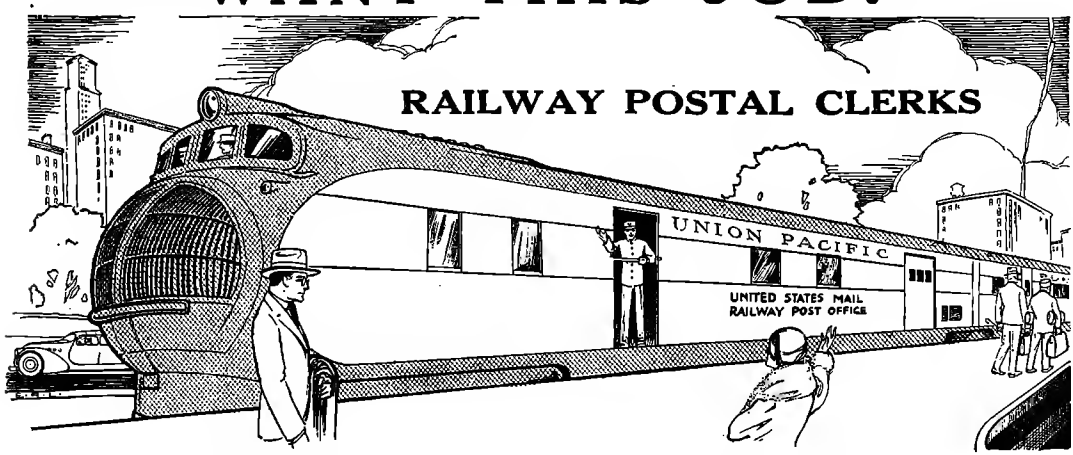

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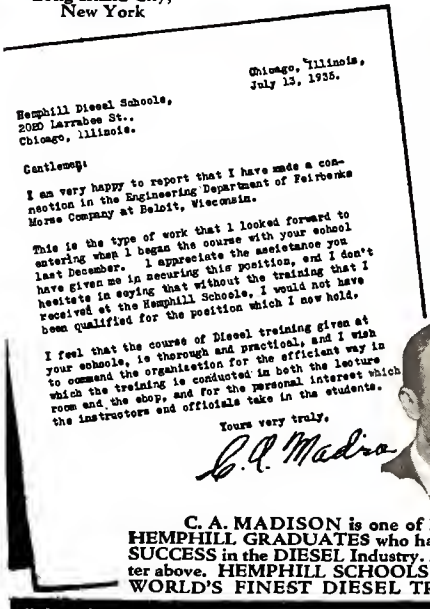

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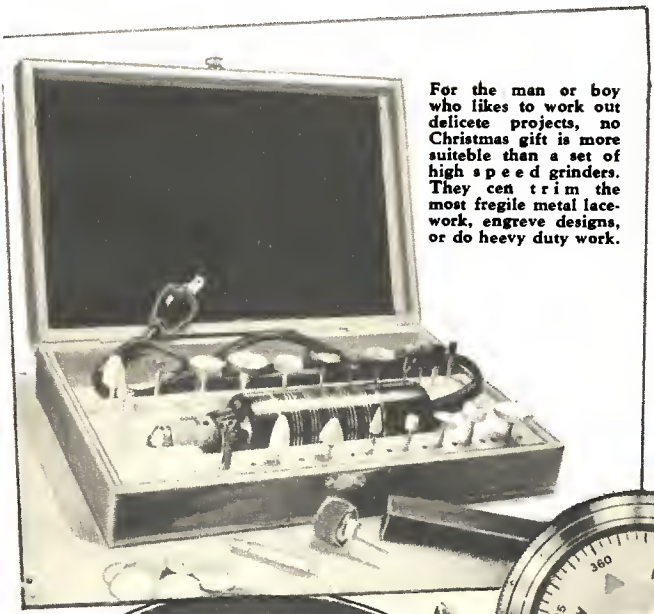
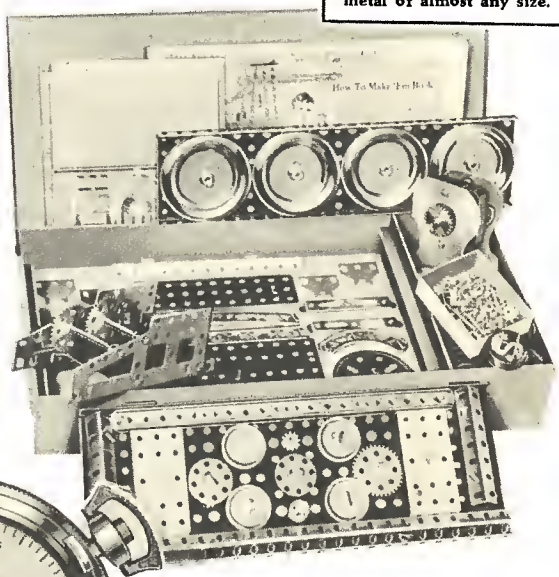
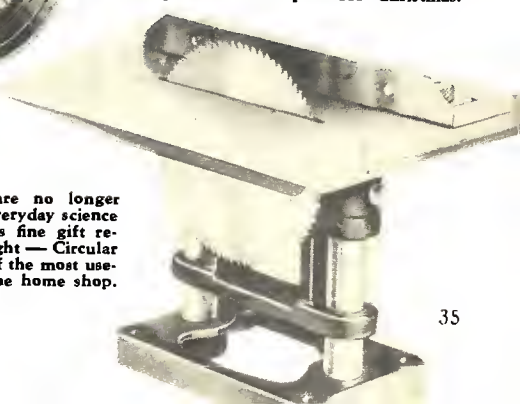


For the man or boy who likes to work out delicete projects, no Christmas gift is more suiteble than a set of high speed grinders. They cen trim the most fregile metal lace-work, engreve designs, or do heevy duty work.



Toys thet instruct by teaching boys to build have long been recognized by educetors es being of primary impottence. Sets such es shown above fill this order in every way. Left—Any hunter or woodsman will more than appreciete e compess for Christmas.



Microscopes are no longer just e toy. Everyday science cells upon this fine gift repeatedly. Right — Circular sews are one of the most useful gifts for the home shop.

"Gasless" TOURING

The nation is fast becoming Dieselized. Automobiles, trucks, and railroads are adopting crude oil engines. Here is an interesting article by a leader in this growing industry.

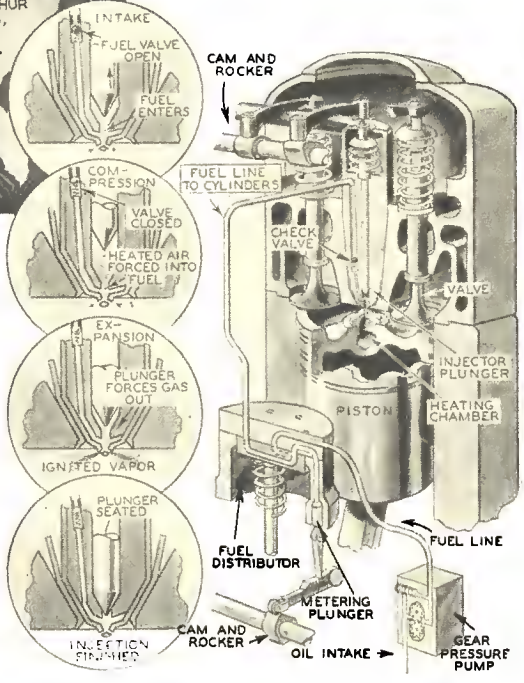
Over this route, 3,774 miles long, Mr. Cummins drove a standard automobile powered with a Diesel engine. The transcontinental trip was made at cost of only $7.63 for fuel.

THE Diesel powered automobile, burning crude oil for fuel, is here!

It is true, as this is written, that there is in existence in this country only one standard American passenger car powered with a production model Diesel engine. This is the Auburn phaeton, fitted with a six-cylinder Cummins Diesel, which I recently drove across the continent, covering 3,774 miles at a fuel cost of $7.63.

But it is also true that the automotive Diesel engine has been perfected to such a degree that it must inevitably become a factor in pleasure car production, as it has already become in the trucking field. It is only three years since the first Diesels were installed in trucks in this country. Today an astonishing percentage of the trucks operated on the highways are Diesel powered. Millions of miles of service have been rolled up, subjecting the automotive Diesel to the most strenuous of tests. The engine has emerged as a perfected piece of mechanism. A mechanic would describe the process as "taking the bugs out" of a design.

What does this mean to you, as the prospective owner of a pleasure car with an engine burning seven cent crude instead of gasoline at three times the cost? It does not mean that you are going to immediately be able to buy a Diesel car in the low price field. I am not rash enough to predict that Diesel automobiles



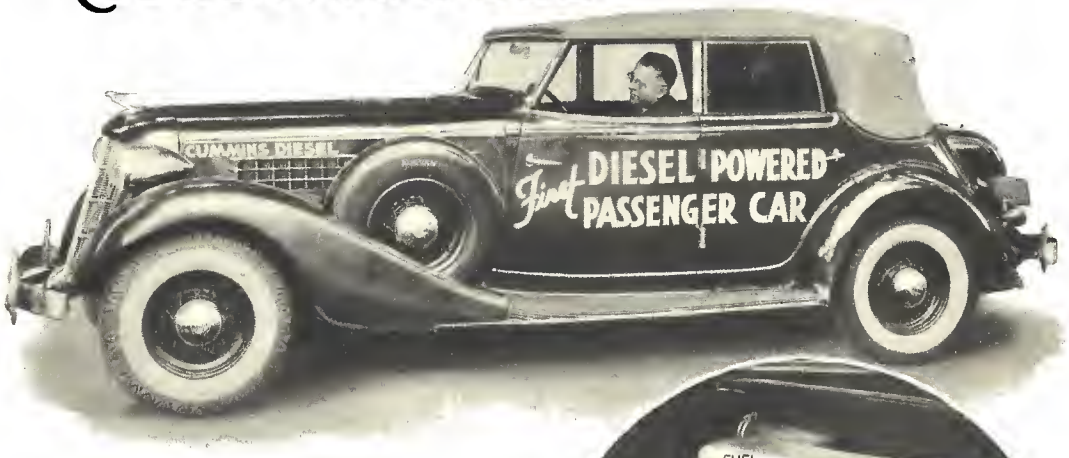
These drawings depict operating principles of the Cummins Diesel engine. Noteworthy features are a metering device to assure the same amount of fuel for each cylinder and a rotor that distributes fuel to each cylinder in proper order, much like the electrical distributor on a gasoline motor. Metering plunger measures a drop of fuel from the pressure pump. On plunger's upstroke this drop is sent via distributor to proper cylinder injector and heating chamber. Upstroke of the injector plunger sucks in hot compressed air from heating chamber in piston which vaporizes fuel. Forced downward by its cam, plunger sprays vaporized fuel into combustion chamber where it is ignited by air at 1000° Fahrenheit.

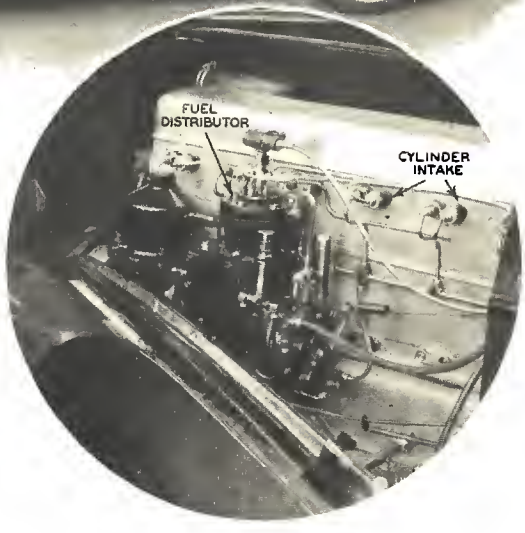
are going to start crowding the highways tomorrow, or even next year. The facts simply are that the automotive Diesel engine has quietly passed through those successive stages of refinement which have made it an economical, trouble-free piece of mechanism for the amateur operator.

Remember the early days of the automobile at the turn of the century? You had to

in a DIESEL *Automobile*

by C. L. CUMMINS
President, Cummins Engine Co.





Above—Mr. Cummins, author of this article, at the wheel of the Auburn pheeton that was fitted with e Diesel engine for the cross country run. Right—Cummins engine installed in the eutomobile. Note its compactness. Distributor, like spark plug rotor, sends measured fuel through intake lines to cylinders in 1-5-3-6-2-4 firing order in the Diesel engine.

HOW DIESEL ENGINE OPERATES

Mr. Cummins explains the Cummins Diesel principle as follows:

The down stroke of a Diesel piston sucks pure air into the cylinder. The upward stroke compresses this air to about 500 pounds per square inch. This raises the temperature to approximately 1,000 degrees Fahrenheit. At this moment gasified fuel is injected, under pressure, into the hot air. The temperature ignites the mixture and the piston is driven downward by the expanding gases.

No electrical ignition system is used. Carburetors are eliminated, as are vacuum tanks, fuel pumps, spark plugs, and batteries. It is estimating the matter conservatively to state that 75% of the repairs on a gasoline engine originate in these accessories, all of which are eliminated by Diesel design. The trouble-free operation thus attained is obvious.

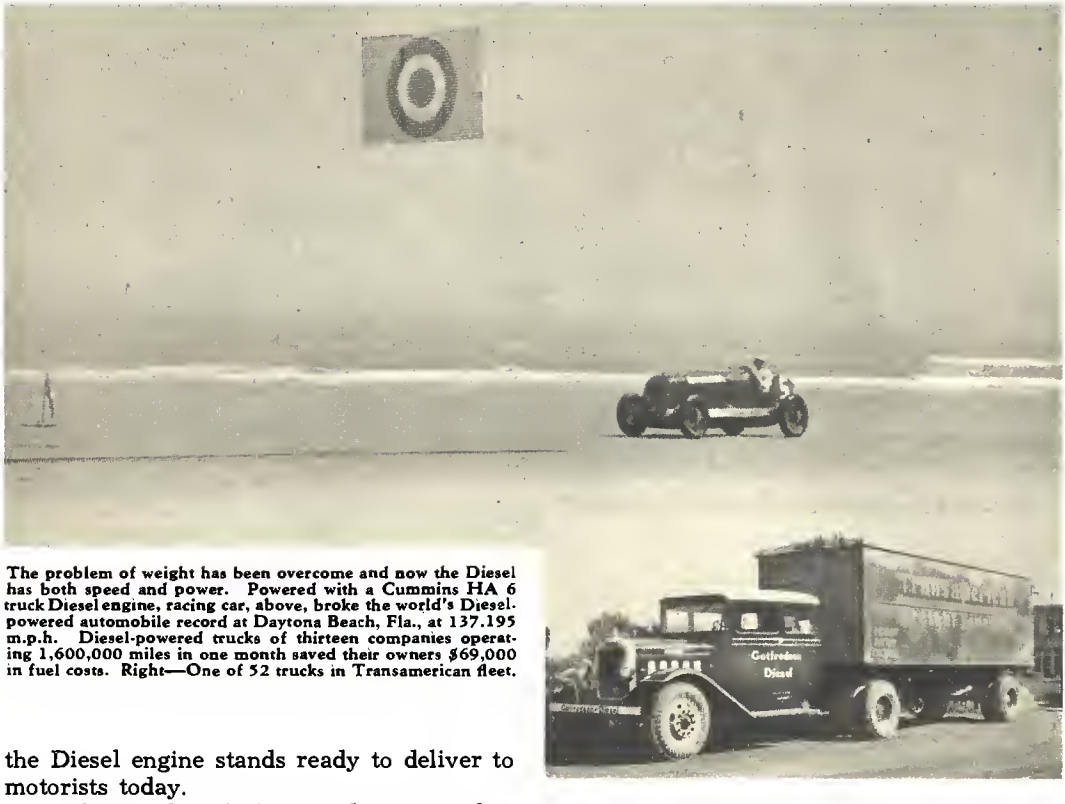
be an expert mechanic even to drive a car in those days. You required an oversize toolchest and were faced with the likelihood of getting out and under every few miles to adjust the doodad or the thingamajig when the durn thing stopped.

This period of development in Diesel design was passed long ago. The automotive Diesel of today operates as smoothly and with as little attention as a gasoline motor. That is why I say the Diesel power plant is here. It is suitable for operation by an amateur. As far as the power plant is concerned, the Diesel car certainly has arrived.

My trip from New York to Los Angeles in my Diesel powered car was in no sense a trick performance. It is typical of what the driver of a Diesel car can expect. The cruising speed was held to around 50 miles an hour, which is an average rate on uncrowded highways. Occasionally the rate was stepped up to 75 miles an hour. One hundred and nine gallons of fuel, at seven cents a gallon, were burned.

Let's assume that you are the owner of a Diesel powered car with a 25-gallon fuel tank. Fill it with oil and you are ready to drive from New York to Chicago without a single stop for fuel! This is the sort of performance which

NEW LIGHT DIESEL MOTORS Have SPEED and POWER



The problem of weight has been overcome and now the Diesel has both speed and power. Powered with a Cummins HA 6 truck Diesel engine, racing car, above, broke the world's Diesel-powered automobile record at Daytona Beach, Fla., at 137.195 m.p.h. Diesel-powered trucks of thirteen companies operating 1,600,000 miles in one month saved their owners $69,000 in fuel costs. Right—One of 52 trucks in Transamerican fleet.

the Diesel engine stands ready to deliver to motorists today.

You have only to look around you to realize that the Diesel engine has caught the public fancy and stands on the threshold of a vast era of expansion. In recent months the name Diesel has made front page headlines in newspapers throughout the country. The new streamlined, Diesel-driven trains are changing the entire trend of railway engineering. In a less spectacular way—so quietly that most persons outside the industry are unaware of what has been going on—the automotive Diesel has been revolutionizing the trucking industry.

Out in Los Angeles, thirteen companies operating Diesel powered trucks rolled up 1,600,000 miles in one month. The fuel saving amounted to $69,000—the difference between the $6,000 worth of fuel oil burned, and the $75,000 which an equivalent amount of gasoline would have cost. It requires no ability as a crystal gazer to visualize the future of the Diesel automotive engine and of the mechanics who take care of them.

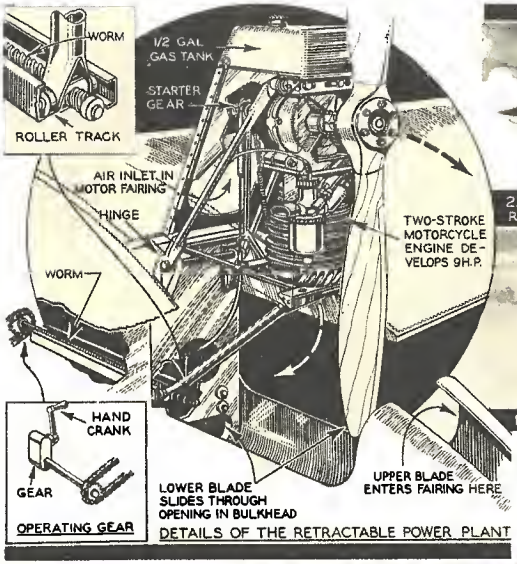
There is a widespread misconception that the Diesel motor is a heavy, cumbersome mechanism which would add half a ton to the weight of a pleasure car and would require a strengthened chassis and lengthened wheelbase to accommodate it. This impression descends from the days before the Diesel was adapted to automotive uses.

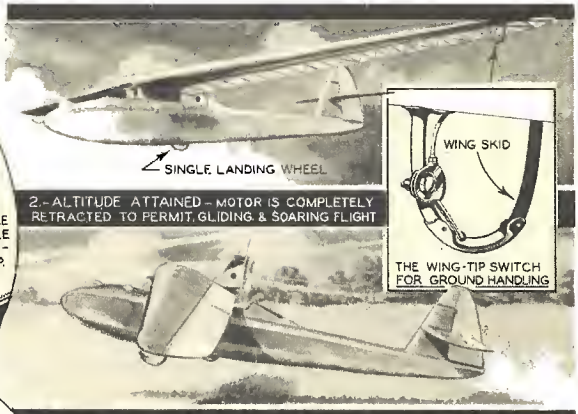
The Diesel engine which was installed in my car occupies practically the same space as the gasoline motor it replaced. The chassis was not altered, for the weight of the two engines is practically the same. The use of aluminum cylinder block and crankcase castings effects a great reduction in weight. Removable liners are used for the cylinder walls. The fuel injection mechanism has been so perfected, as I will explain later, that the necessity for building the motor overweight to withstand the tremendous pressures developed in Diesels using the old type of common rail fuel feed or individual high pressure pumps has been eliminated.

Because of the high pressures developed within a Diesel cylinder—500 pounds per square inch, as compared to a maximum of 150 in a gasoline motor—only the very best of construction materials can be used. This, and the fact that Diesel engines are not yet

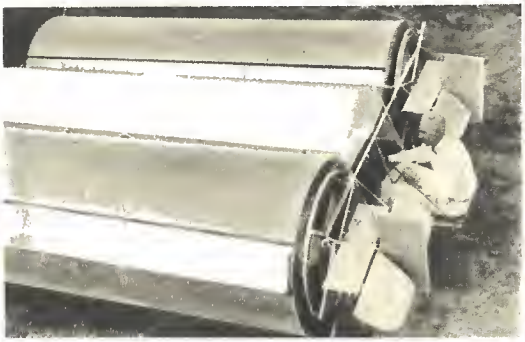
[*Continued on page* 123]

New WINGS and MOTORS Startle Airmen

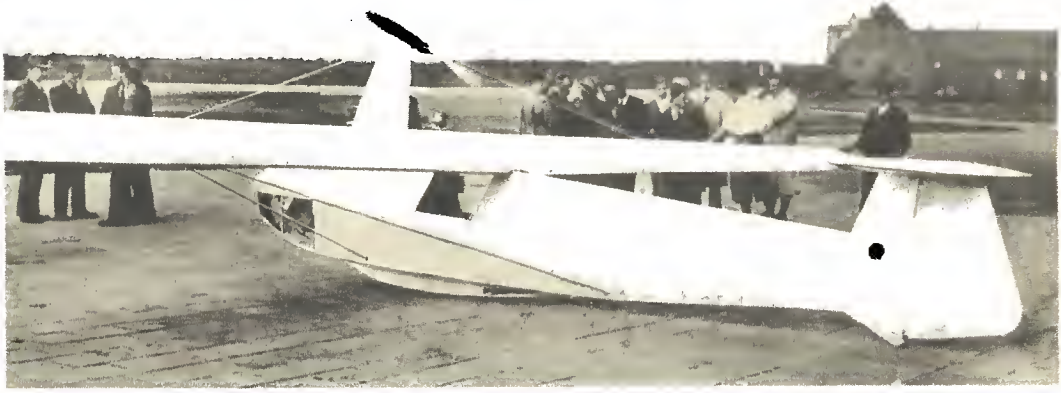



SINGLE LANDING WHEEL
WING SKID
THE WING-TIP SWITCH FOR GROUND HANDLING
2.-ALTITUDE ATTAINED-MOTOR IS COMPLETELY RETRACTED TO PERMIT GLIDING & SOARING FLIGHT
1.-TAKING OFF-AUXILIARY MOTOR EXTENDED FOR NORMAL FREE FLIGHT

At an altitude of 2,000 feet, the pilot of this Carden-Baynes auxiliary sailplane folded the motor into the fuselage, and using only air currents, proceeded to glide to his destination. It is the first plane in history to use a retractable motor, and the experiment is being watched with considerable interest. The drawings show the technical details.



Gravitational force diverted forward by two revolving cylinders powered by a motorcycle engine is to provide the propulsion for this rotor plane. J. E. Caldwell, designer, of College Park, Md., claims it will rise and descend vertically. Right—This unique bicycle plane was exhibited recently at the Inventor's Fair, held annually in Paris.



This plane is claimed to be the first flown by human power. The feat was accomplished by a German gliding expert who, using a bicycle-like attachment geared to the propellor, was able to launch the plane into the air for a sustained flight.

Florida Begins Channel Larger Than Panama Canal

This blast set off by President Roosevelt in New York, launched the work on the $146,000,000 Florida canal. The canal will be 195 miles long, as shown on the map, and will save 2½ days between New York and New Orleans.

PRESIDENT ROOSEVELT, pressing a telegraph key in his Hyde Park, N. Y., home, set off the dynamite blast which began work on the $146,000,000 canal across northern Florida. The canal will save 2½ days in the sailing time between the Gulf of Mexico and the Atlantic Ocean.

In the matter of dirt to be moved and distance to be covered, the Florida project is larger than the Panama Canal. The engineering difficulties are less, however, as the Florida canal will follow, wherever possible, the courses of the St. Johns, Oklawaha, and Withlacoochee rivers.

All bridges crossing the canal will have a minimum vertical clearance of 135 feet. Minimum depth of the water will be 30 feet.

Scientist Finds Stratosphere Hot

A STRATOSPHERE of 1,000 degrees Centigrade 150 miles from the earth is reported by Prof. E. V. Appleton, British radio authority, who bases his theory on the reactions of radio waves sent 150 miles straight up. The waves were undoubtedly affected by an intense heat which robbed them of their vital properties, he reported.

Outboard Racer Sets World Mark

SKILLFULLY piloting his speed boat through a field of some of the best racing experts in the country, Frank Vincent, pioneer outboard motor racer of Tulsa, Okla., won the feature race of the National Outboard Motor Regatta on Lake Sequoyah with a new world's record speed of 51.546 m.p.h.

A new world record for outdoor motor racing was set by Frank Vincent, above, with a speed of 51.546 m.p.h. The new mark was made at the National Outboard Motor Regatta.

Strato-Rocket Nears Completion

Here is one of the stratosphere rockets designed by Dr. Goddard to speed vertically at 700 m.p.h. Dr. Goddard, who is fourth from the left, was visited recently by Col. Lindbergh.

A ROCKET flight 150 miles into the stratosphere at a speed of more than 700 miles an hour was predicted for sometime next year following a visit of Col. Charles A. Lindbergh and Harry F. Guggenheim at the rocket laboratory of Dr. Robert H. Goddard near Roswell, New Mexico.

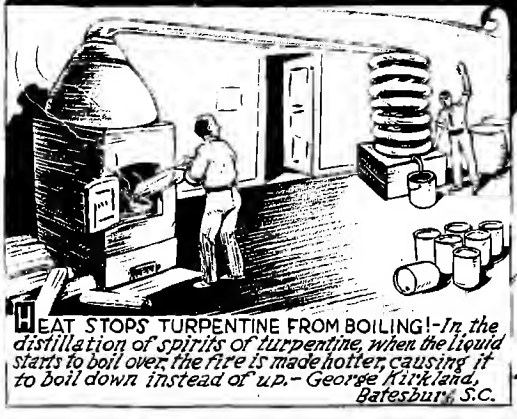
In a joint statement, Dr. Goddard and Mr. Guggenheim reported great advancement in their discoveries, and announced that next year's flight would be for the purpose of gathering information on electrical phenomena such as the reflection of radio waves in the upper stratosphere.

Present plans call for a parachute attachment to the rocket so that scientific instruments may be safely lowered.

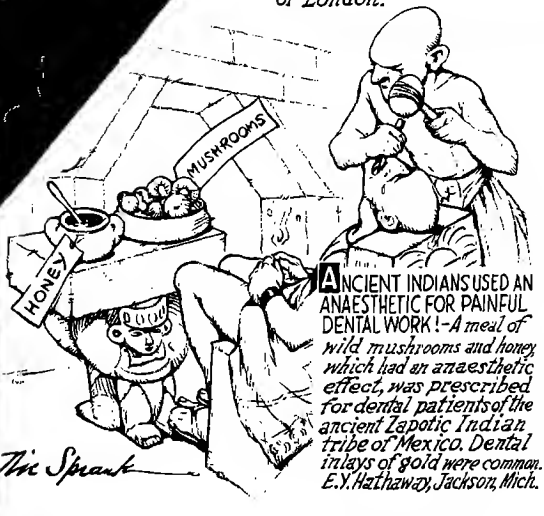
Smoke Cities Fool Enemy Air Raiders Says Nic Sprank in Oddities of Science

CARS COAST UPHILL NEAR MONCTON, NEW BRUNSWICK! *The hill is variously called Deception hill, Hill of Mystery, and Magnetic hill. Visitors parking their cars near the bottom have frequently been startled at seeing their cars start coasting up the hill.—*
Austin Gregory
Fredericton, N.B.

PHANTOM SMOKE CITIES FOOL ENEMY AIR RAIDERS! — *British air authorities have developed Colored Smoke screens of brick red, grey, yellow, and brown. They float horizontally above ground in various layers, pierced here and there by columns of black smoke. Seen from above, the smoke produces a realistic illusion of an industrial city. In fact, aerial observers photographed such a screen in the belief it was a suburb of London.*



HEAT STOPS TURPENTINE FROM BOILING! *—In the distillation of spirits of turpentine, when the liquid starts to boil over, the fire is made hotter, causing it to boil down instead of up.—George Kirkland,*
Batesburg, S.C.



Nic Sprank

ANCIENT INDIANS USED AN ANAESTHETIC FOR PAINFUL DENTAL WORK! *—A meal of wild mushrooms and honey, which had an anaesthetic effect, was prescribed for dental patients of the ancient Zapotic Indian tribe of Mexico. Dental inlays of gold were common.*
E.Y. Hathaway, Jackson, Mich.

Win $1. Send your Oddity of Science to Nic Sprank, Modern Mechanix Publishing Co., Minneapolis, Minnesota. None accepted unless source or proof is given. Do not include oddities with other manuscripts or letters. None are returned.

Filming TABLE TOP

by
EARL THEISEN
Honorary Curator of Motion Pictures, Los Angeles Museum.

When the director calls for floods, train wrecks, and volcanoes, the miniature men create the scenes. Read how they produce these effects.

Above—Filming destruction of a city by a volcano through the use of miniatures, as conceived by an artist. The burning boat is actually a moving picture being projected on glass screen by the projection machine. Erupting volcano is painted on glass, while cameramen at left photographs entire composite scene. Springs and rollers produce jarring for earthquake. Right—One step in photographing "Last Days of Pompeii." Water foreground and burning boat with real-life actors remain to be added to finish this scene.

BEHIND the studio walls tucked off in a corner may be found the miniature department. It is hidden away where persons will not interfere with its work or find out its secrets.

To the miniature man everything is possible from the fabrication of airplane crashes, train wrecks, explosions, floods, to the bringing to life on the screen of prehistoric monsters. In this department of the studios is filmed those things that cannot be photographed or are too dangerous to be photographed in full size. The miniature men are specialists in reproducing literally on a table top practically anything that occurs in real life.

In a picture entitled, *Last Days of Pompeii,* the destruction of this historic city by a volcanic eruption can be seen on the screen. Because of the risk to human life and the expense involved, it was impossible to make the volcanic scenes other than by miniature. Besides, by using miniatures, a more forceful and realistic story could be made. Streams of flowing lava, smoke, flying debris, destruction of huge buildings, and other volcanic phenomena were reproduced for the screen in this picture. To do this was no simple

EARTHQUAKES

Above—Destruction of New York City by earthquake and flood in the motion picture "Deluge," a scene impossible except in miniature. Model of the city was built, each building being a perfect reproduction. Walls were then broken and reassembled with adhesive tape so that they could be pulled apart easily. The liners are models in a tank of water. Left—Test photo in an attempt to balance water foreground with rest of scene for "Last Days of Pompeii." This scene now represents four superimposed pictures: The village painted on glass; the smoke and clouds; the volcano painted on glass; real life water in which boat and actors appear. Flying birds are to be added.

matter; chemistry, physics, and much creative ingenuity contributed to the filming. Some scenes required as many as five trick superimposures exposed on the same film.

One such scene depicted a boat burning in the harbor of Pompeii. In the background Mt. Vesuvius was shown erupting while the streets of Pompeii began to fill with smoke and ash. The burning boat with real-life players was photographed in full size and then later added to the miniature scene by what is known in the studios as the "projection process." This process consists of projecting the movie of the burning boat to a screen placed in the miniature setting. The screen being of glass is easily camouflaged in the setting. By moving the projector, which was out of camera lines near the screen, a proper balance between the size of the boat and the miniature city was reached.

To photograph this entire scene it was necessary to run the negative through the camera five times, each time a different portion of the picture was photographed.

First the city of Pompeii was photographed showing the streets beginning to fill with smoke and ash. The negative was then rewound in the camera and a second exposure was made showing Mt. Vesuvius; then another exposure introduced the smoke and fire effects which were being ejected from the mouth of the volcano; finally the burning boat was added. A fifth exposure introduced birds flying about in the scene.

The various exposures were required because different methods or "processes" had to be used for the various effects. The smoke and fire effects had to be photographed at high speed in order to get the proper floating and billowy effect. Then the clouds were superimposed over the city by "stop-motion," which is the studio name for the process of photographing action photograph by photograph rather than continuously as is done

Reproduce NEW YORK CITY for EARTHQUAKE SCENE

Workman above are constructing replica of New York City for scene on page 43. Foreground is tank for water.

Scene above is a clever illusion produced through use of miniatures. The city apparently on the sand dunes in the background actually is in front of the actors. Built in miniature and attached to framework at left it fitted properly into perspective. Left—Touching up a tabla top scene showing the grounds and exterior of a house before photographing. Note reflection in glass screen back of set.

when "shooting" real life stars. In "stop-motion" the action is photographed pose by pose on motion picture film. When the progressive poses are projected in the theatre at high speed, the poses blend together to give the illusion of motion.

In the destruction of Pompeii, the use of "stop-motion" made it possible to project the picture of the clouds and falling ashes into the city while the city was being destroyed. This was done by projecting the motion picture of the clouds, which was taken at high speed on to a "split screen." The "split screen" which was placed a few inches in front of the camera lens in this "shot" is a partially silvered mirror which reflected the image of the clouds and at the same time permitted the camera lens to see through the mirror to photograph the miniature city. In this way the two pictures were combined.

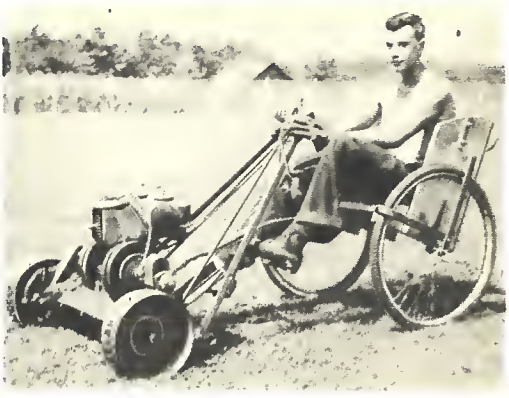
In the fabrication of the destruction of a building by earthquake in *The Last Days of*

[*Continued on page* 124]

Bicycle Wheeled Chariot Makes Sport of Mowing Lawns

LIVES there a small boy who has not at some time or other dreamed of riding behind the lawn mower, guiding it like a dictator instead of toilsomely pushing it through the tall grass which should have been cut a week ago?

The long awaited day has at last arrived. Attached like a chariot behind a power lawn mower is a comfortable two-wheeled cart for the driver. The whole affair can easily be made at home, and wherever there are large expanses of lawn which require the attention of a power motor, the chariot will save miles of walking.



Here is what every smell boy who has ever pushed a lawn mower hes dreemed about. This lawn mower chariot is home mede of bicycle wheels, a few boerds, and some strap iron.

Oil Bathing Preserves Eggs' Youth

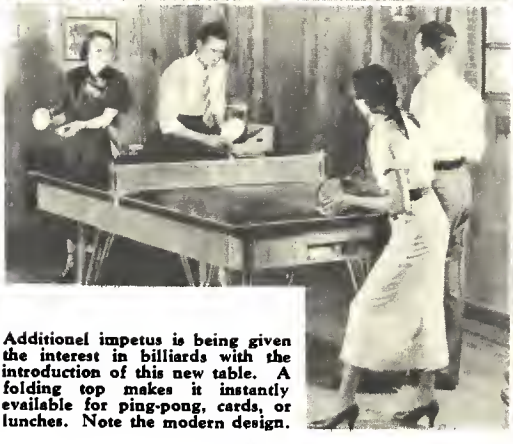
THE suspicion with which every housewife regards "cold storage" eggs will soon be unfounded as the result of a new egg preservative developed by the Food Research Division of the U. S. Department of Agriculture. The eggs are immersed in oil in an air tight chamber, a vacuum created, and then, as the eggs are lifted above their oil bath, the vacuum is released with carbon dioxide. Eggs so treated keep without loss of flavor.

Modernization Overtakes Billiards

THE growth of games and sport for the home having taken an unprecedented leap in the last five years. As a result manufacturers are more than ever on the alert for something new in home recreation.

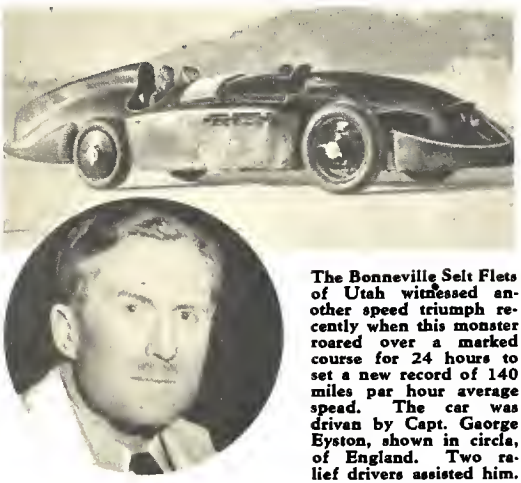
More than keeping pace with recent innovations is the age old game of billiards. To place the game in the home, one manufacturer has perfected a light, rigid playing surface to replace the heavy slate bed formerly used. This new bed, mounted in a streamlined table, is covered with a twilight shade of cloth which science declares is best suited for the eyes.

Two men can install the table in six minutes. Not content with designing just a billiard table, the manufacturer added a folding utility top which can be converted into a ping-pong table, card table, or even a banquet table.



Additionel impetus is being given the interest in billiards with the introduction of this new table. A folding top makes it instantly available for ping-pong, cards, or lunches. Note the modern design.

Second British Racer Breaks Record



The Bonneville Salt Flats of Utah witnessed another speed triumph recently when this monster roared over a marked course for 24 hours to set a new record of 140 miles per hour average speed. The car was driven by Capt. George Eyston, shown in circle, of England. Two relief drivers assisted him.

ANOTHER speed record returned to England when Captain George Eyston, following close upon the heels of his fellow countryman, Sir Malcolm Campbell, raced his car across the salt flats of Utah to set a mark averaging in excess of 140 m.p.h. for a 24-hour-run.

Capt. Eyston's giant red car, streamlined after the fashion of some monster of the deep, hurtled across the flats shattering records on almost every turn. Officials of the American Automobile Association are checking carefully to discover just how many new records Eyston and his two relief drivers did set. The previous record was 135.47 m.p.h.

Rider Powers Bike at Both Ends

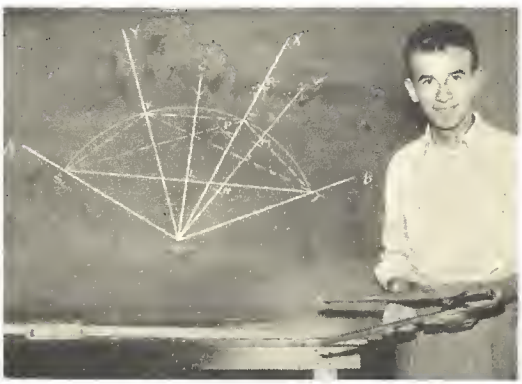
THE health giving exercise furnished by bicycle riding has been more than doubled by the invention of S. J. Hamilton, Los Angeles, who has powered his machine at both ends. He calls his invention the Exercycle.

In place of handlebars, Hamilton has mounted a sprocket with grip pedals which supplies arm power to the front wheel. Leg power drives the rear wheel in the customary manner.

A speed of 45 miles per hour can be developed on the Exercycle, and on one occasion Hamilton pedalled to San Diego and back, 280 miles, in a single day.

Here is the Exercycle, a bicycle powered at both ends. S. J. Hamilton is shown here with his invention following a trip in which he made 280 miles in one day. It builds arm muscles.

Youth Solves Tri-Section of Angle



Theodore Macknik, 21-year-old mathematician of Mahanoy City, Pa., startled scientists recently with his geometrical trisaction of an angle. His unique method is described below.

THE geometrical tri-section of an angle has been solved to the satisfaction of numerous mathematicians by 21-year-old Theodore Macknik of Mahanoy City, Pa. No one has yet worked out a mathematical solution.

Using O as a center, Macknik drew an arc intersecting lines OA and OB which form the angle. He bisected angle AOB, labeling the bisecting line C. Angle COB was then bisected with line OV. Taking a radius at random, and using O for a center, he drew points L and N on lines OC and OV. Using the same radius and N as his center, he drew point M on line OV. Intersecting arcs from L and N form point P. Point R is formed by intersecting arcs from P and M. He then drew line OX through point R. Using S and Z as centers, he bisected line SZ at K to form line OY. Lines OY and OX trisect the angle.

Mechanical Rat Has Brain Which Rivals That of Namesake

A MECHANICAL brain on wheels which can "remember" how to find its way home, and "see" its way through an intricate maze that would puzzle an intelligent person is the invention of Dr. Stevenson Smith, nationally famous psychologist of the University of Washington.

The invention, which he calls the "mechanical rat," operates on a series of tracks, some of which are through lines, and the others dead end spur lines. After scurrying about locating the dead ends by the trial and error method, the rat is able to follow the through line past the maze of cross tracks with never an error. Hours later the rat is able to duplicate its performance, revealing an uncanny memory.

This is the machanical rat whose ability to find its way through tha above maze has astonished sciantists. Once it finds an unobstructad path, the weird rat navar forgats it.

Practice Tee Reveals Golf Errors

Year round golf is possible on this naw machina which not only tells when a ball has been sliced or hookad but gives the yardage as well. The inset shows a close-up of the mater.

HOOK, slice, topped ball or straight drive, all are clearly recorded on a new golfer's driving device designed for winter practice. As each practice stroke is made, a meter registers the distance the ball would have gone, while two other needles register the amount of hook or slice. The ball is mounted on a wheel which holds it at correct height.

Water Pump Makes Exhibition Tour

BUSINESS men, always on the alert for something new in salesmanship, studied with interest the traveling library, and saw it increase book circulation nearly 100 per cent. Shortly thereafter there appeared on the road whole display rooms mounted on trucks or even installed in passenger trains.

The idea proved so successful that now trucks carrying single exhibits are making their appearance. First of these is the Crane Co.'s water pump exhibit, which takes the display room directly to a prospective customer in a Dodge Panel truck.

When it is inconvenient for the customer to visit the show room, the showroom is brought to him. Hera is a traveling watar pump axhibit which doas much to convince customars.

$1750.00 CASH

123 PRIZES

First prize	$750.00 IN CASH
Second prize	300.00 IN CASH
Third prize	100.00 IN CASH
10 Fourth prizes	20.00 EACH
10 Fifth prizes	10.00 EACH
50 Sixth prizes	5.00 EACH
50 Seventh prizes	1.00 EACH
TOTAL—123 PRIZES	$1,750.00 IN CASH

ANSWER THESE QUESTIONS

1. What is your age and occupation?
2. Do you live in an apartment, house, or on a farm?
3. What is the approximate value of your shop tools?
4. What tool or power equipment do you plan to purchase next for your home shop?
5. Approximately how much do you spend each year for lumber, pain., and hardware? List each separately.
6. Do you read any other magazine containing home workshop projects?
7. Are you interested in projects devoted to (a) metal working, (b) wood working, (c) electricity and radio, (d) model making, (e) chemistry, or (f) photography?

THE RULES

1. Cut out the three sertions in eech scrambled photo. Reassamble tha parts in their proper order to form photographs of prominent man or woman.
2. Paste eerh assembled photograph on a sbeet of papar. Idantify thase men or women by name and tell, in 25 words or less, tba part aarh played in his or her partirular field of activity.
3. DO NOT MAIL YOUR ENTRY UNTIL ALL NINE SCRAMBLED PHOTOGRAPHS HAVE BEEN PUBLISHED. The finel three scrambled pictures will eppear in the January issua.
4. Copy and answer the questions listed ebove and submit them with your antry. Your replies to these questions will not be considered by the judges in ewarding prizes, but to be eligible each entrant MUST answer the questions.
5. In ten words or lass write e slogan that in your opinion best describes this magazine. Slogens ere to become the sola property of Modarn Mecbenix Publishing Co.
6. This rontest is open to everyone excapt employes of Modarn Mechanix Publishing Co., and members of thair families.
7. You don't bava to buy a ropy of this magazina or be a subsrribar to enter tbis rontest. Recognizable facsimiles of the photograpbs will be considered by the judges.
8. Contestants need not submit aleborate entries. Neetness, brevity, and eccuracy will be the deciding factors. No entries will be returnad.
9. The editors of this megazine will be the judges. Their decisions ere finel. In cese of ties duplicete prizes will be awarded.
10. Mail your antry to Contest Editor, Modern Machanix Publishing Compeny, Greenwirh, Conn. Write your full neme and address clearly. Entries must be postmerked on or before Jen. 3, 1936. Winnars will be ennounrad es soon es possible efter the close of the contest.

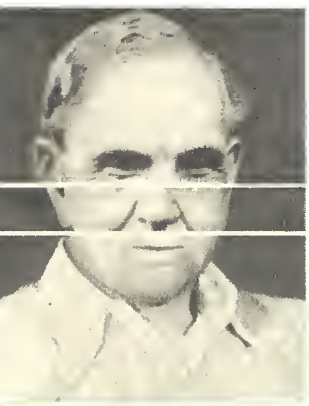
Offered in Jumbled Photo Contest

EVERY prize is cash money in this big $1,750.00 scrambled photo contest, and every reader has a chance to win one of the 123 awards.

The contest is simple. Last month three scrambled photos were published. They are reproduced here in smaller size with the second installment of three jumbled pictures. Each group of three can be cut out on the white lines and assembled correctly to form photographs of three prominent persons. These persons are leaders in the fields of science, industry, aviation, sports, and exploration.

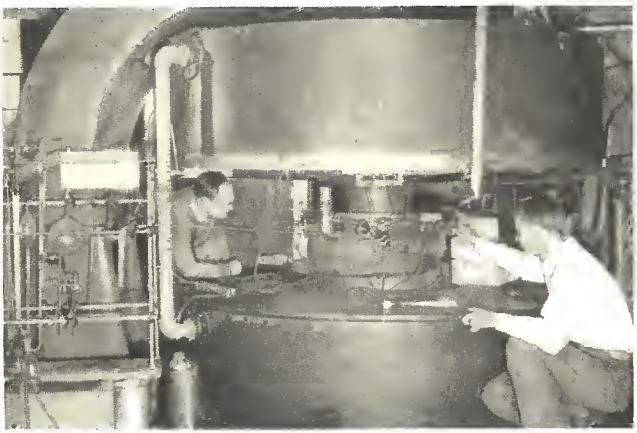
Carefully read the rules on the opposite page and don't forget to include the slogan which will be judged with your entry. The final installment of this contest will appear in the January issue when three more scrambled photographs will be published.

In addition to proper assembling and identification of the photographs, the judges will use the ten word slogan submitted with each entry as a basis for awarding prizes. Answers to seven questions on opposite page must be included with each entry.



Smaller scrambled photos at left and below are republished from the November issue. Here are tips to their identification: One is e leeder in the automobile industry; another was e populer sports champion; end the third wes world-renowned inventor. Properly essembled three large photos this month will reveel feces of three persons prominent in aviation. One is noted as en explorer; one is co-inventor of e medicel device; and the third wes the first pilot to fly solo from Heweii to Californie. All three pilots have mede ocean flights and heve blazed pioneer treils in the eir to foreign lends.

Substitute For Costly Radium Found In Treated Table Salt



Here Dr. R. L. Thorton and Dr. E. McMillan, who assisted Dr. Lawrence in his experiment, are shown loading the chamber in which sodium will be submitted to a bombardment of hydrogen atoms to become a radium substitute.

ATOMIC bombardment of ordinary household chemicals with hydrogen has yielded an economical substitute for radium, the world's most costly metal. The process, discovered by Dr. Ernest Lawrence, 34-year-old scientist of the University of California, will result in a saving to hospitals of thousands of dollars.

Sodium, which can be derived from common table salt, has been found to be the most receptive metal. Before being bombarded with hydrogen atoms, the sodium is placed in a heavy mechanism and whirled about until it has absorbed the energy of 5,000,000 volts.

After the hydrogen bombardment, a single batch of the sodium has the radio active potency of $3,500 worth of radium.

Clock Timer Never Forgets Task

This little device never forgets. It turns off lights, turns on the radio, or starts the fire.

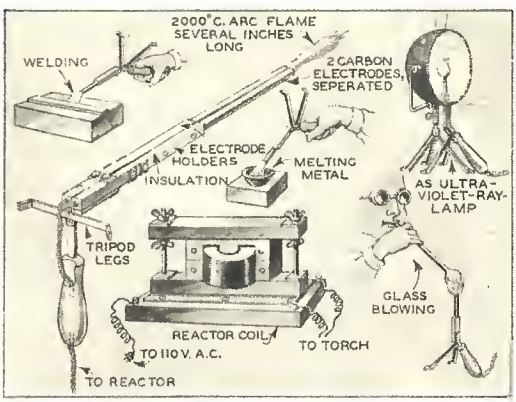
DEFROSTING refrigerators, turning off lights, or turning on the oil burner—any of those tasks so often forgotten, are now cared for by a mechanical time guardian. The electric device turns them on or off on schedule or at any chosen time.

Telephone Dial Tunes In Radio

A RADIO set which is dialed to any desired station much as a telephone number is dialed is the product of a German manufacturer. Each station is assigned dial numbers which correspond to its broadcasting frequency.

Here is the latest in radio tuning, a telephone dial which dials in the selected program.

Dentist Invents An Electric Torch

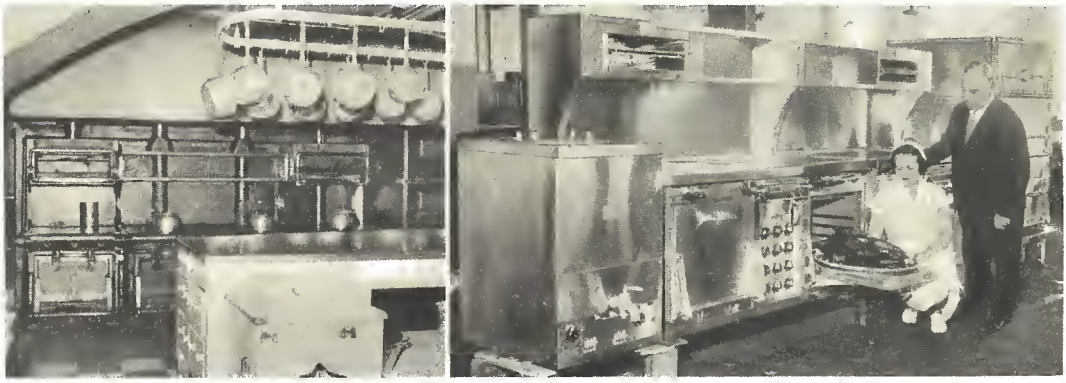


This electric blow torch produces temperatures of more than 2,000 degrees centigrade. It is based on the principle of the voltage arc formed between two electrodes placed in parallel.

AN ELECTRIC blow torch possessing a flame from two to three inches long with a temperature of more than 2,000 degrees centigrade has been invented by Dr. Alberto Bustamante, a dentist of Mexico City.

The appliance has two metallic bodies insulated from each other and attached to a wooden handle. A carbon electrode is inserted in each body, and the flame is started between the electrodes by a spark from a third carbon . It operates on an alternating current of 110 volts, and requires about 1500 watts. It is highly useful in laboratory work.

Electricity Is Chef In White House



On the right is the way one wing of the White House kitchen will appear when President Roosevelt and his family sit down for Thanksgiving dinner, while on the left is the way it appeared before remodeling. The First Kitchen of the Land will be all-electric, and will contain such improvements as timing devices, temperature adjustments, and robot controlled ovens.

GONE are the old style ranges which formerly browned the presidential turkey, and when President Roosevelt, family and guests are seated about their Thanksgiving table they will be served a banquet such as the venerable White House has never seen before.

In place of the gleaming black stoves there will be sleek, stainless metal, all-electric ranges embodying the latest features known to science. The turkey and pumpkin pie will be browned to a turn by robot chefs, while the real chefs are left free to practice their art without fear of the stove's over-heating.

By Thanksgiving the entire kitchen will be remodeled on a scale second to none in the country. Once more the First Lady will have the First Kitchen of the Land.

Bats Break, But Pitcher is Happy

Lou Garland, Los Angeles pitcher, is shown in his home workshop converting broken bats into souvenir lamps. He even uses baseballs in the design. Note his coffee can light shade.

SOUVENIR lamps from broken baseball bats is one way Lou Garland, star pitcher for the Los Angeles Angels, has found for turning hard luck at the bat into good fortune in the home workshop.

Garland started his hobby by converting the broken bats into lamps for his companions who broke them. Later the fans began clamoring for his handicraft, with the result that his team can no longer break bats fast enough.

Book Ends Hold One Book or Dozen

A SELF expanding scroll ends the search for the adjustable book ends. The scroll is four inches wide and twenty inches long. It can hold one newspaper alone, or will expand to hold as many as twelve books. An ebony rest prevents rolling.

This scroll forms a set of self-expanding book ends pliable enough to hold just one magazine or as many as 12 books.

BROADCASTING

by DONALD G. COOLEY

While 50,000 fans witnessed this Notre Dame-U. of S. C. game, hundreds of thousands "saw" it through announcer's binoculars and the family radio.

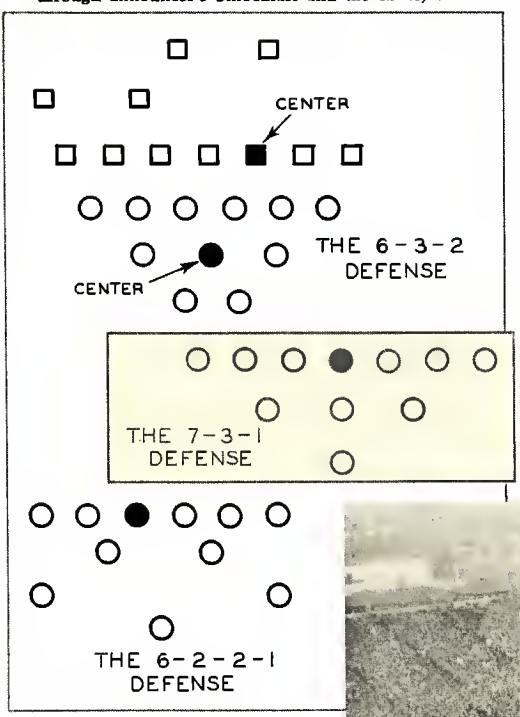
A SHRILL whistle blasts the signal for the kickoff. A warcry rises from the throats of fifty thousand spectators jammed into the bowl at Gridiron Stadium, Collegetown. The game is on—but for every yelling fan in the stadium, twenty others are watching that same game through their radio loudspeakers.

They see every play as fast as it is made. The voice of the announcer makes it clear instantly just what playing strategy was involved, what rules were infracted, if any, and why that penalty was imposed. The radio spectator, in fact, has a more accurate technical picture of the game than ninety percent of the actual witnesses.

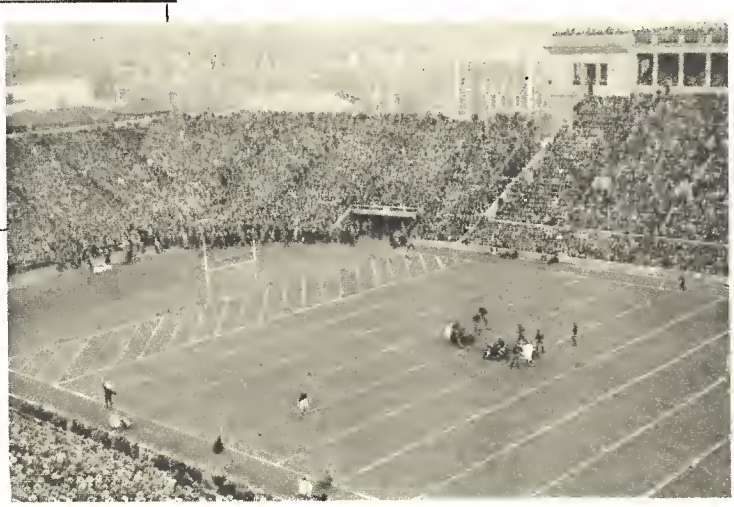
What sort of miracle is this? How is it possible for an announcer to analyze those gridiron plays in a split second, to identify players unerringly from a huddled mass of jerseys, keeping up a running fire of expert comment for three solid hours at the rate of two hundred words a minute?

Ted Husing, ace sports announcer of the Columbia Broadcasting System, is probably the most painstakingly scientific of all football broadcasters. With his partner and observer, Les Quailey, Husing has evolved a system which has made him "the tops" in this highly specialized field.

"The mechanics of a football broadcast depend largely on what I call my 'light box'," Ted Husing explained. Husing invented the device himself back in 1930, and since



When you hear Ted Husing announce a 6-3-2, 7-3-1, or 6-2-2-1 defense, you can picture the players as being in the positions diagrammed above. Right—From the radio box high above the gridiron the players resemble frantic midgets, and the task of identifying the ball carrier in split second time calls for keen eyes and an unerring judgment of plays. That's why Ted Husing and Les Quailey believe in advance scouting.



FOOTBALL *with* *TED HUSING*

Unseen rooters in countless thousands attend each football game with Ted Husing. They "see" each play through his binoculars even more accurately than do the spectators.

A lull between halves finds Ted Husing, left, conferring with his partner, Les Quailey. Note their signal boxes.

then Les Quailey has helped him improve it.

The mechanism rested upon a desk as we talked. The "light box," as shown in one of the accompanying photographs, is in reality two boxes, about the size of portable adding machines. It is a simple but extraordinarily effective invention for blending two brains into one—Husing's and Quailey's. The boxes, a pair of powerful binoculars mounted on a pivoting tripod, and a microphone constitute all the equipment used by this broadcasting team.

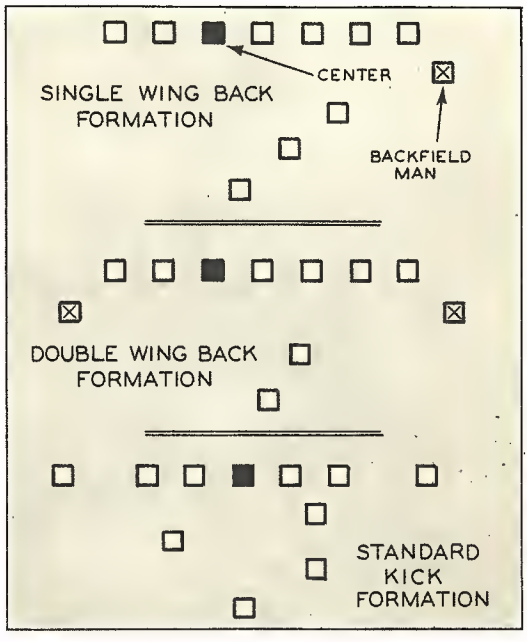
The pair broadcast from a press stand at the very top of the stadium. Quailey sits at Husing's elbow. Usually they tack a roster of players on a wall before them. This is to make it easier to identify the player by his number, though this is seldom necessary.

"Les keeps his eyes glued to the binoculars, following the play," Husing said. "He swings the glasses with his right hand. His left operates his section of the light box. When a play occurs, Les presses a button. A light flashes on in the box under my eyes, lighting up the name of the player who carried the ball. I'm watching the action on the field all the time, remember—giving a running account of what is happening. Out of the corner of my eye I see the light flash on under my eyes, glance down and confirm the identity of the player concerned, and am able to give credit where it's due."

Quailey's section of the light box is divided into two halves, one containing eleven red keys, the other eleven white ones. The keys are marked previous to the game with the identifying numbers the players wear on their jerseys. Seven keys arranged in a row are the linesmen. Beneath them are four other keys representing the backfield, spaced apart at intervals large enough to allow Quailey's outstretched fingers to rest between them. An identical arrangement is repeated in the second set of keys. There you have the twenty-two opposing players.

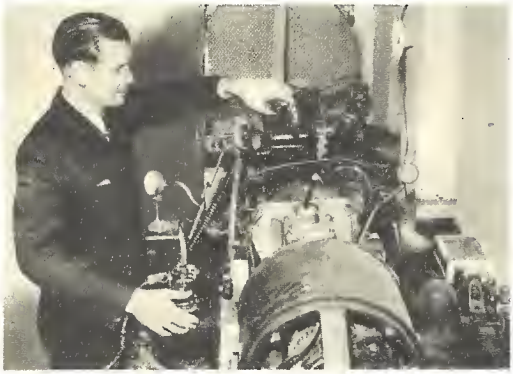
Quailey's unit is connected with Husing's box by an electric wire. Husing's light box is similar, except that instead of keys, holes are cut in its surface which permit light to shine through a translucent covering on which he

[*Continued on page* 134]



No longer can plays remain nameless if the radio audience is to understand the games. Some of the plays, with radio's descriptive terminology, are shown in the above diagrams.

Water Succeeds Gasoline As New Invention Is Perfected



This water powered motor is the invention of G. H. Garrett, who is shown here with his right hand upon the electrolytic carburetor which obtains explosive hydrogen from water.

WATER powered automobiles are predicted for the not too distant future as the result of an invention of G. H. Garrett of Dallas, Texas, which substitutes water for gasoline.

Garrett uses an electrolytic carburetor which breaks up water by electrolysis into its component gases, hydrogen and oxygen, and then forces the explosive hydrogen into the combustion chambers for fuel.

For operating the automobile motor on which the tests have been conducted, Garrett has added an over-size generator to supply the extra electricity needed by the carburetor. Beyond that, the motor has needed no changes, though it has been in operation continuously for several days.

Garrett has protected his device with patents.

Camera Lens "Sees" Like Human Eye

A "THIRD DIMENSION" camera lens which can, without focusing, picture objects two inches away as clearly as tall buildings a mile away is the invention of Jack Sussman, newspaper photographer and adventurer. The lens is similar in action to the human eye, and captures all objects in the foreground and background with equal clarity.

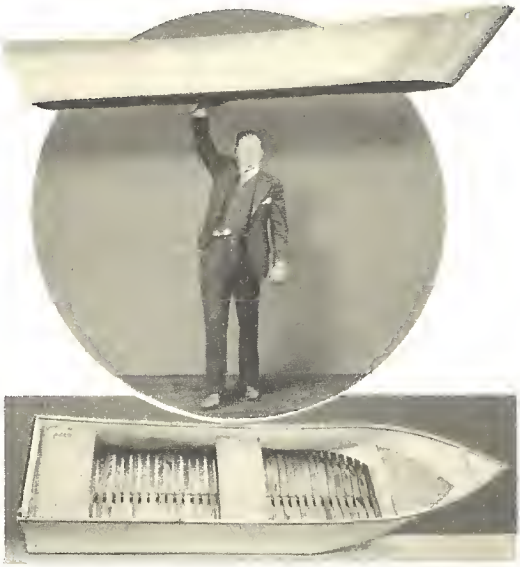
Snowplane Finds Favor In North

BECAUSE a snowplane which he designed and built for himself proved so successful, Karl Lorch, Spy Hill, Sask., Canada, soon found himself in the manufacturing business, supplying snowplanes to mounted police, prospectors, and doctors.

The streamlined bodies are made of airplane tubing and linen, and seat four persons. An airplane or automobile motor may be used to power the pusher type propeller. Speeds up to 70 miles per hour are possible.

Gliding upon three skiis, the first one of which does the steering, this snowplane makes as high as 30 miles to a gallon of gas. Its success started its builder in a new business.

New Row Boat Cuts Water Friction



Here is the new all-metal rowboat so light in weight it can be lifted in one hand, and yet too sturdy it withstands the roughest kind of water. The seats are disguised air chambers.

AN unsinkable, all-steel boat designed by a former sea captain, combines the lightness and speed of an outboard speed boat with the sturdiness of a row boat. It has no keel, ribs, or braces of any kind and air chambers provide the seats. One person can lift or row the boat with ease, and with an outboard motor, speeds up to 40 miles per hour are possible. It can be made of any type of sheet metal.

Looking at M. M. Through a Microscope

by JULIAN D. CORRINGTON, Ph. D.

DID you ever listen to the jargon of printers or newspapermen when they get to talking about process work—the reproduction of illustrations? They prattle along about rotogravure, zincs, halftone screens and so on in a manner indicating an enviable familiarity with all of this fascinating work. Let's take our microscopes and get the lowdown on the pictures in this issue of MODERN MECHANIX AND INVENTIONS!

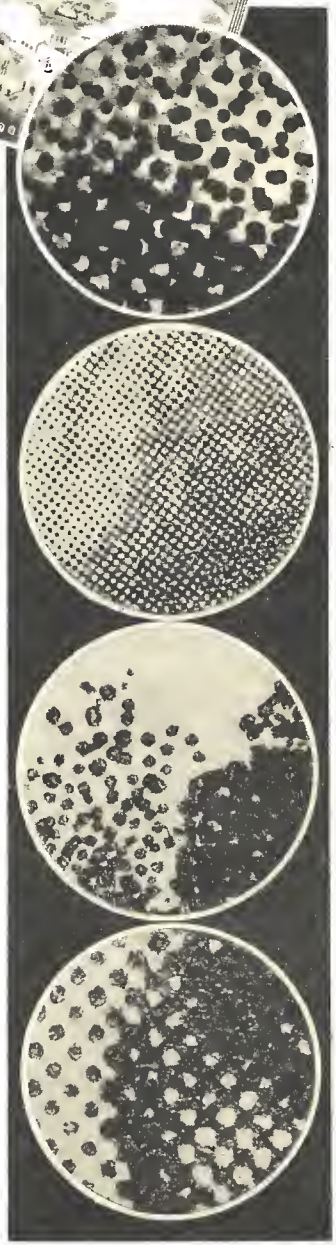
Use the lowest power permitted by the combination of eyepieces and objectives with which your own microscope is equipped, and employ transmitted light of moderate intensity. Begin with one of the drawings used in the advertising section, one that is obviously a pen-and-ink sketch. Cut out a portion about three-quarters of an inch square having considerable detail, such as a person's head, and place this bit of paper in a small glass vessel of xylol for five minutes, then transfer to a clean microscope slide, and mount in balsam.

Examine under the microscope and note how the artist built up his picture solely through the use of lines and dots. He em-employed a black India waterproof ink and a smooth, stiff drawing surface, making outlines and then obtaining shading effects by means of fine sketch lines or by closely spaced dots, a method termed stippling.

Through the lens, such work will look coarse and uneven, but the fact that the drawing has been reproduced as a zinc etching will be at once apparent by entire absence of a screen. A plate of zinc is eaten by acid at all points except where the ink of the original drawing occurs, leaving all such places as raised lines and dots. They alone receive ink during printing.

Now similarly make a slide from a photographic illustration in the Editor's Workbench department and study this mount with your microscope. The first thing that strikes the

[*Continued on page* 132]



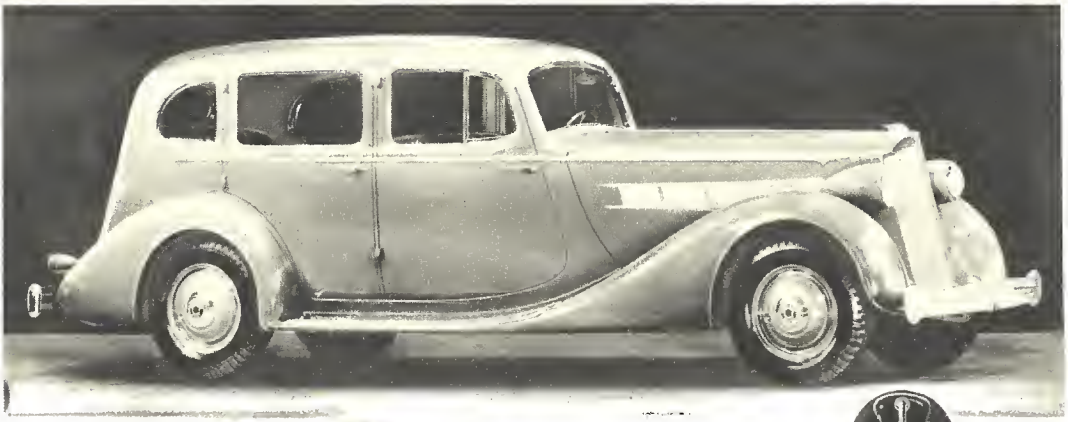
When viewing four color screen print such as is found on the cover of this magazine, the color dots are intermingled as shown at right.

The single fine screen of the black and white roto is clearly shown in this micro-photo. Find a rotogravure illustration in M. M.

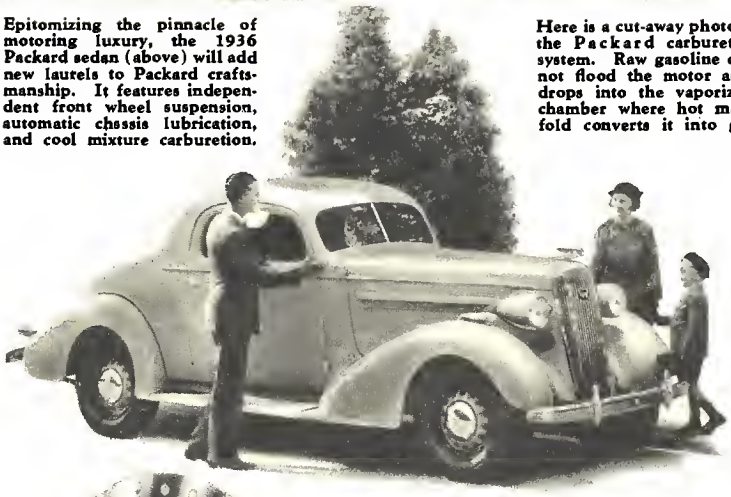
Here is a zinc etching, showing how the artist has obtained shading effects by stippling the original drawing with fine dots.

This coarse screen halftone is magnified 9 times. It shows a man's hair line on forehead. Note how this screen differs from the rotogravure.

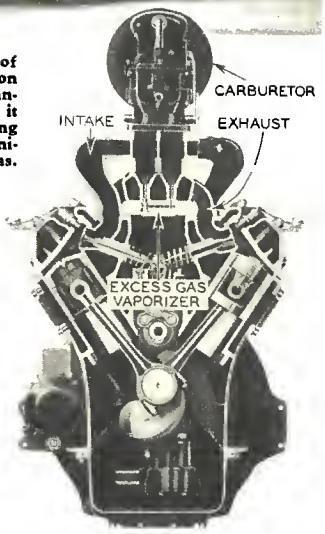
MM'S SHOWROOM

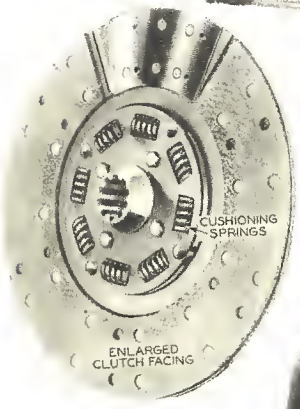


Epitomizing the pinnacle of motoring luxury, the 1936 Packard sedan (above) will add new laurels to Packard craftsmanship. It features independent front wheel suspension, automatic chassis lubrication, and cool mixture carburetion.

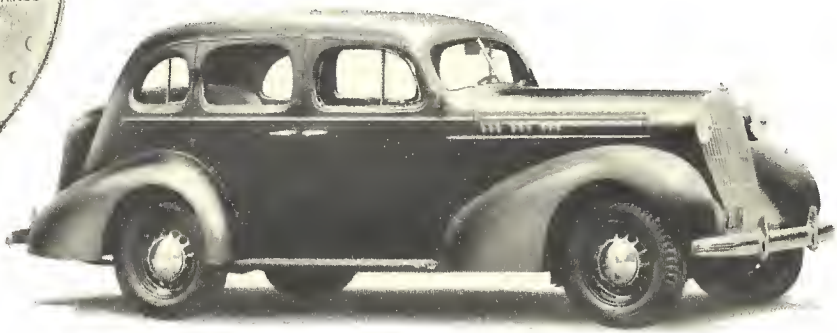


Here is a cut-away photo of the Packard carburetion system. Raw gasoline cannot flood the motor as it drops into the vaporizing chamber where hot manifold converts it into gas.



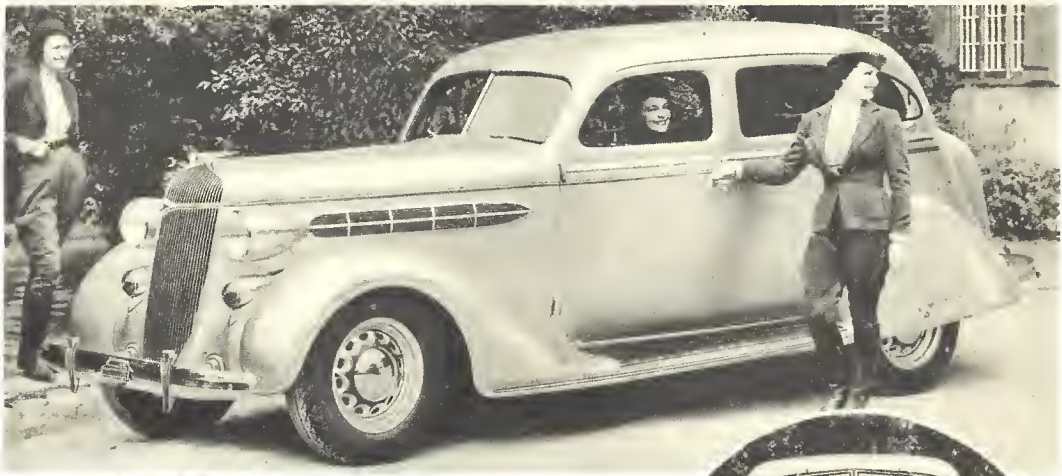


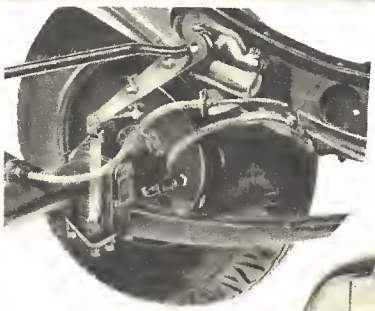
Upholding Buick's reputation for dependability and exceptional performance will be this sleek sport coupe (above) of Buick Series 40. It is powered by a 93-horsepower straight eight engine of valve-in-head design. One of its features is the new light-pressure clutch, shown at left. To provide additional smoothness when the clutch takes hold, individual cushioning springs are inserted between the fabric facing and metal base.



Oldsmobile remains in the forefront in style streamlining with its 1936 models, and in addition has added several new refinements and mechanical features. The sedan model is at right.

of 1936 AUTOMOBILES

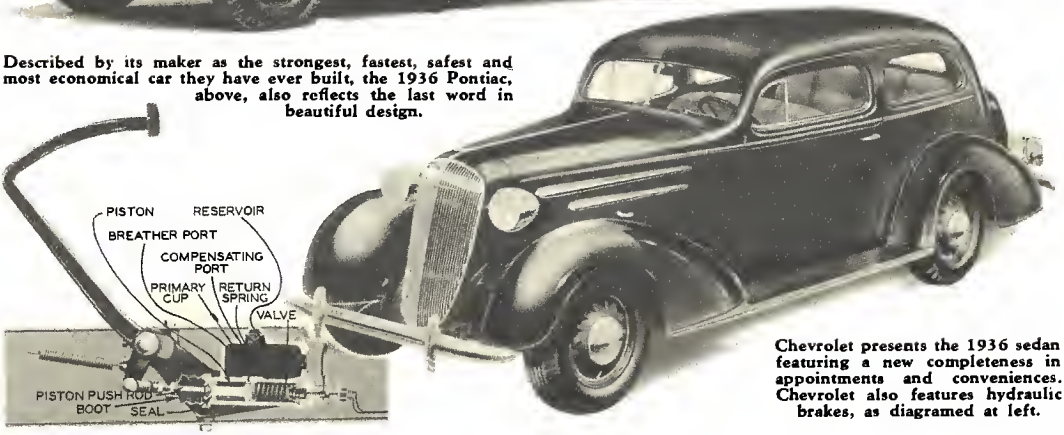




Adhering closely to the lines which made it so popular in 1935, the 1936 Chrysler has centered its attention upon added refinements in interior appointments and riding comfort. Left—A view of the rear wheel suspension of the 1936 Pontiac, showing sealed spring, shock absorber, hydraulic brake cable, and the oversize brake drum.

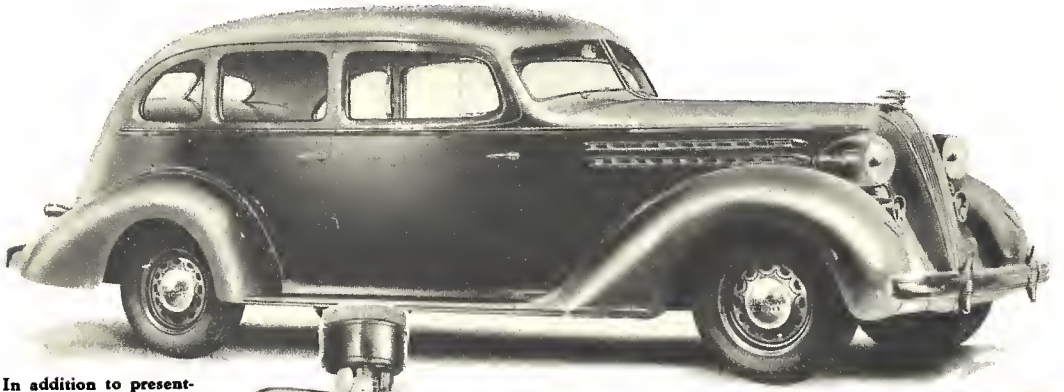
Above—The 1936 Chrysler Airflow as it will appear when you meet it on the highway. It is when seen from this angle that the airflow lines are most apparent, the fenders, hood, cowling and body blending together harmoniously.

Described by its maker as the strongest, fastest, safest and most economical car they have ever built, the 1936 Pontiac, above, also reflects the last word in beautiful design.

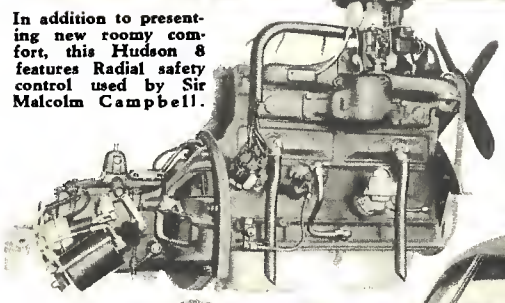


Chevrolet presents the 1936 sedan featuring a new completeness in appointments and conveniences. Chevrolet also features hydraulic brakes, as diagramed at left.

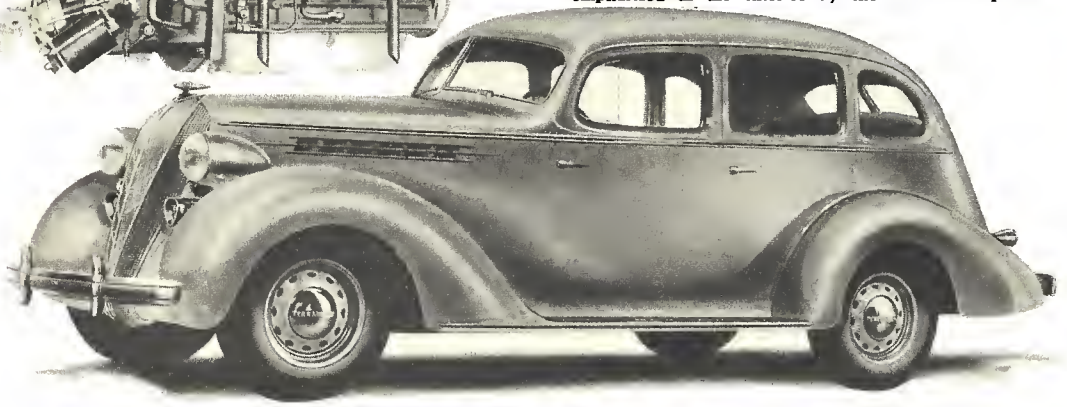
Safety Is Predominant Factor In 1936 Cars



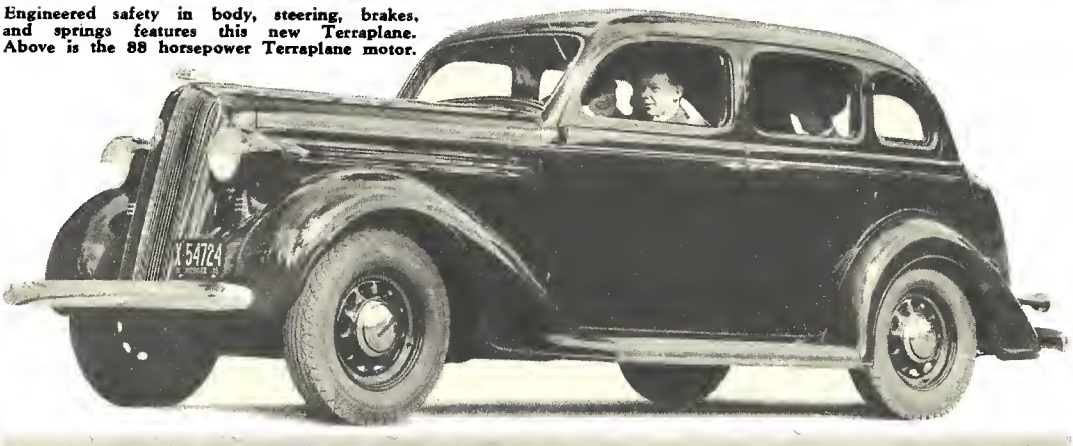
In addition to presenting new roomy comfort, this Hudson 8 features Radial safety control used by Sir Malcolm Campbell.



The striking design of the new Hudson is further emphasized in the interior by the instrument panel.



Engineered safety in body, steering, brakes, and springs features this new Terraplane. Above is the 88 horsepower Terraplane motor.



More than 400 rubber parts, totaling 50 pounds of rubber exclusive of tires, serve to cushion this 1936 Plymouth from all types of vibration, body rumble, and road shocks. Non-glaring headlights penetrate fog and rain, while improved hydraulic brakes add to the car's safety. The Plymouth is longer and lower than before, adding to its smart appearance.

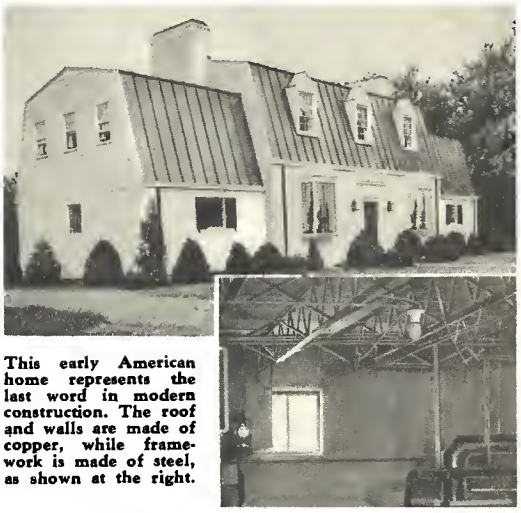
Copper Home Defeats Father Time, Weather, Fire, Insects

THE grace and dignity of the early American home plus all the ultra-modern conveniences of the pre-fabricated dwelling are incorporated in a house of copper recently introduced on the market.

Features of the copper house are many. In addition to being practically ageless, the structure is claimed to be proof against weather, fire, lightning, and the ravages of insects. A four-inch blanket of spun glass between the walls and beneath the roof insulates the house as effectively as would 8-foot walls of solid concrete.

The interior framework for floors and walls is made of steel. Over the roof is placed a wood deck covered with copper sheets, while the outside walls are composed of heavy plate copper backed by a cushion of composition board.

The house may be painted in any of several colors, or, left to oxidize a natural green.



This early American home represents the last word in modern construction. The roof and walls are made of copper, while framework is made of steel, as shown at the right.

Electric Eye Reads for the Blind

As this book passes line by line beneath the machine, the type is converted into electrical impulses which register on the little desk. The blind can read the impulses by touch.

THROUGH another miracle of science the blind will now be able to read books or newspapers of ordinary print.

The reading machine is the invention of A. G. Goldman of the Physics Institute of the All-Ukranian Academy of Sciences. A book or paper is inserted in the machine, which moves it line by line beneath a microscope. The magnified images of the letters are projected upon a photo-electric cell which converts them into electrical impulses. The blind reader places his fingers upon a small desk on the top of which the impulses are registered, and can translate with ease.

Air Blast "Blows the Coal Down"

BY BLASTING with air instead of dynamite, coal mines in Illinois and Indiana have been successful in increasing their output while greatly reducing the danger to miners from fumes.

The air is compressed in a specially designed cartridge to a pressure of 15,000 pounds. The cartridge is then inserted in a hole drilled to size, and the air suddenly released. Instead of delivering a crashing blow, the air expands with pushing force, dislodging great chunks of coal. Coal dust and small chips are reduced to a minimum. The miners do not have to leave the level during the explosion, and can start mucking out immediately.

In place of dynamite, this cylinder of compressed air is being inserted in the coal. When the valve is released, the expanding air pushes out the coal, gently but firmly.

The Suez Canal—KEYSTONE

Bird's-eye view of strategic spots in the difficulties that threaten Europe and Africa. The Suez canal is England's pathway to her possessions and the roadway for Italy's troops to Africa. Italy might block the Mediterranean as shown.

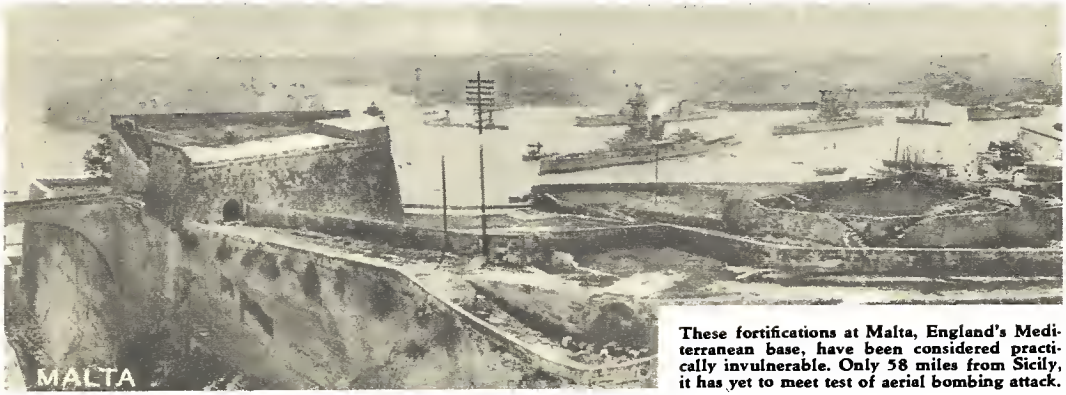
THAT link between the Red and Mediterranean seas, the Suez canal, the shortest sea route between Europe and the Orient, is the keystone in the arch of war and peace. This 100-mile waterway can become the spark that would set off another world war or it can be the means of restoring peace in Europe.

The canal is the "life line" of the British Empire, the central link in the chain between England and her far-flung possessions. Effectively closed, the Suez canal may block the path by which Italy communicates with her troops concentrated in southeast Africa for war with Ethiopia.

Can the Suez canal be closed? If so, what effect would it have on the threatened war in Ethiopia? Theoretically the canal can not be closed to any nation during peace or war.

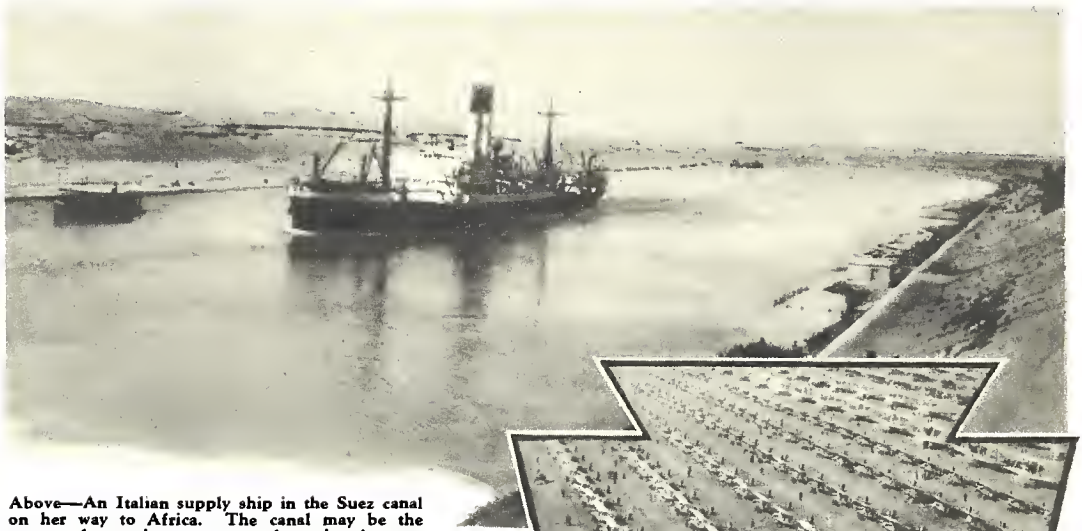
How then does the Suez canal become the keystone of war? Glance back at its history. It was built in ten years, 1859-1869, under the leadership of the French engineer, Ferdinand de Lesseps. Administration of the canal rests in the hands of a private corporation. The company is predominantly French, 21 of its directors being French, 10 British, and one Dutch. The British government owns only 44 per cent of the stock, yet can strategically control the canal.

Realizing the importance of the Suez in war



These fortifications at Malta, England's Mediterranean base, have been considered practically invulnerable. Only 58 miles from Sicily, it has yet to meet test of aerial bombing attack.

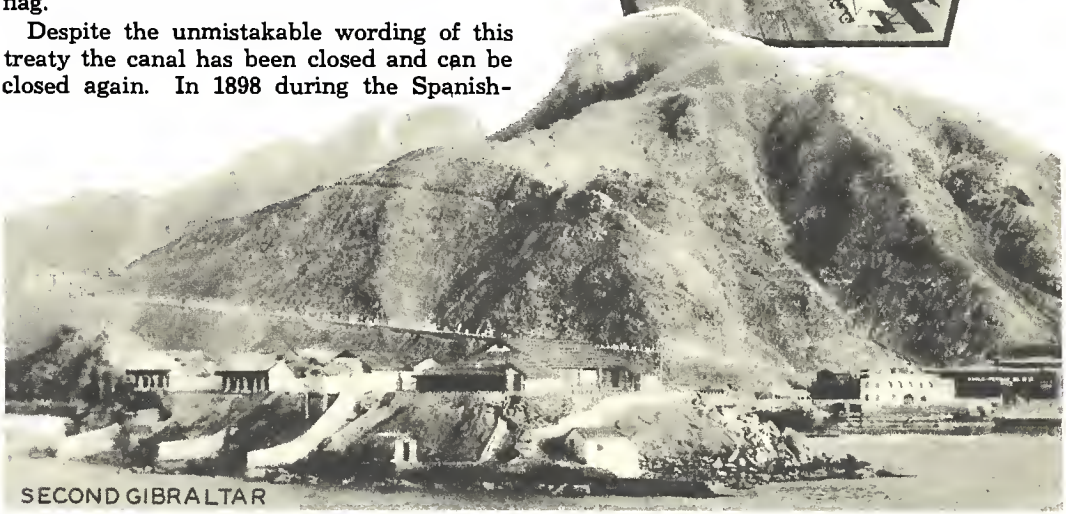
of the ETHIOPIAN WAR



Above—An Italian supply ship in the Suez canal on her way to Africa. The canal may be the means of restoring peace or of starting international war. Right—Part of the 1800 planes in Italy's giant air armada, the world's second largest.

when a British force closed it during Egyptian uprisings of 1882, the leading nations of Europe—Great Britain, Austria, France, Germany, Italy, the Netherlands, Russia, Spain, and Turkey—gathered together in international conference in 1888. The result was the Suez Canal Convention in which the signatory powers agreed that "the Suez Maritime Canal shall always be free and open, in time of war as in time of peace, to every vessel of commerce or of war, without distinction of flag."

Despite the unmistakable wording of this treaty the canal has been closed and can be closed again. In 1898 during the Spanish-



Great Britain could bottle up both ends of the sea route from the Atlantic to the Orient and Africa. Gibraltar controls entrance to the Mediterranean. Aden, a second Gibraltar, (above) similarly stands guard over Red Sea entrance.

RADIO is ETHIOPIA'S Only Link with World

In mountainous Ethiopia well-drilled Italian troops conduct modern warfare against Haille Selassie's warriors. Italian officers (above) are in charge of native artillery men enlisted from African colonies for the invasion.

Barefoot Ethiopian regulars man the anti-aircraft gun (above) in attempt to bring down Italy's air fighting ships. Trained for months in Eritrea, the Italian soldiers (left) were ready for the hardships of the war.

Should Italian forces cut the railroad between Addis Ababa and French Somaliland, this radio tower would be Ethiopia's only communication link with the world.

American war, authorities refused under a provision of the treaty to permit the Spanish fleet to coal at Suez on its way through the canal. At the outbreak of the World War enemy ships in the canal were escorted to the open seas. Thereafter, English and French warships effectively blockaded the seas at either entrance to the canal. That is how Great Britain can close the canal again. It can blockade both entrances with its great naval armada.

In that event Italy would probably resort to air warfare. Its bombers could, if necessary, fly the 900 miles from the toe of Italy's boot to the Suez Canal or the equal distance from the Italian island of Sardinia to Gibraltar. Those bombers might succeed in breaking the blockade at both ends of the Mediterranean.

Huge Bomb Proof Shelter Built in Addis Ababa

Anchor in the lifeline between Great Britain and her colonies is impregnable Gibraltar (above). Right: At base of Addis Ababa radio station Ethiopian workers build huge bombproof shelter to protect thousands. Fearing sudden attack, the work on the underground shelter was rushed.

In Mediterranean danger zone Great Britain concentrates world's third largest naval fleet, second only to entire fleet of U. S. and of Japan. Above is fighting plane and aircraft carrier Eagle.

Over the rocky trails trucks were abandoned as Italian soldiers (above) carried equipment for frontier warfare.

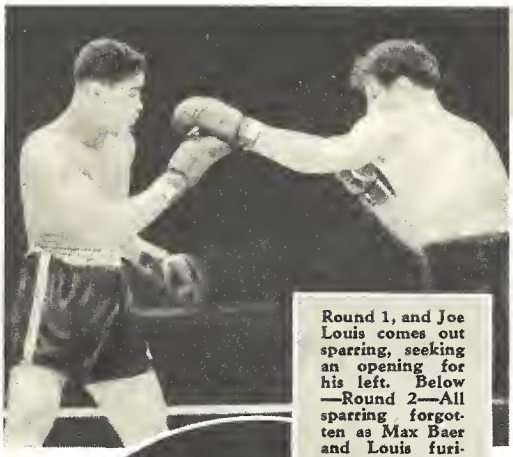
For emergencies at Malta, Aden, and other posts England rushed her "Tommies" by transport ship.

More likely Italy would not adopt such a radical course. During months of preparation Mussolini sent more than 225,000 troops and ship loads of supplies through the Suez to Eritrea and Italian Somaliland. As soon as the wet season in Ethiopia ended, he struck quickly. With airplanes, tanks, and artillery the Italian forces moved into Ethiopia from the north and from the south in a movement intended to trap Emperor Haille Selassie's army in

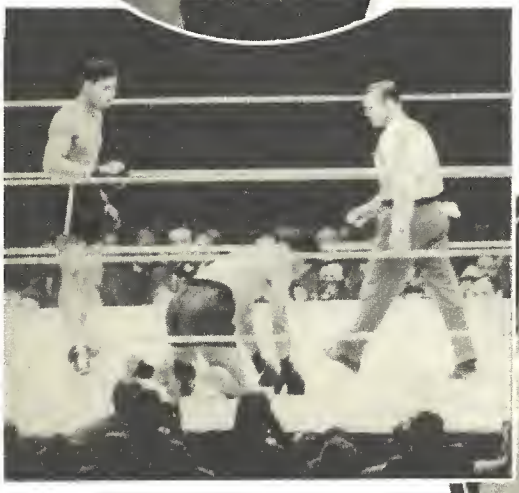
[*Continued on page* 118]

JOE LOUIS

by **JACK MILEY**
Boxing Editor, The N. Y. News



Round 1, and Joe Louis comes out sparring, seeking an opening for his left. Below —Round 2—All sparring forgotten as Max Baer and Louis furiously exchange lefts and rights.



Above—Round 3 finds Max Baer dazed by the ferocious onslaught of Bomber Louis. Louis' piston like blows bring Max to the canvas. Joe stands over him, waiting. Max gets up, covering himself and hoping for the bell. Round 4, right —It's all over after 11 minutes and 50 seconds of battle. The announcer holds Joe's hand aloft in token of victory, automatically making him the leading heavyweight contender for the world's championship. Most writers claim he can't be stopped.

BIG league boxing embodies the mechanical principles of bridge-building, cabinet-making and automotive assembly work, in the opinion of Joe Louis, whose crushing kayoes of Primo Carnera and Maxie Baer have cast a dark and ominous shadow across the doorstep of James J. Braddock, the world's heavyweight champion.

There can be no doubt that Louis knows where-of he speaks; for at one time or another the Ring Robot has taken a fling at all of the above-mentioned crafts!

Joe Louis, in an exclusive interview at his Pompton Lakes, N. J., training camp the day after he crashed the colorful Baer to the canvas before a crowd of 80,000 in New York's Yankee Stadium, had this to say of the relationship between boxing and mechanics:

"I apply the same mechanical principles to boxing as I would to operating a piece of machinery. My hands and feet, my legs and arms, are the tools of my trade. I employ these as would any workman doing his daily job in a factory.

"My body is a machine. I have been trying

Master Mechanic of Boxing

Joe Louis wanted to be a cabinet maker or a mechanic until boxing claimed him. Now he embodies ideas acquired from those trades in big league boxing.

Joe Louis is as relentless in his training as he is in the ring. The former cabinet maker, mechanic, and steel worker calls upon his past experience to aid him in the grueling training grind. In shadow boxing as above, or bag punching, as shown at left, Joe makes every shift and blow mean something.

to develop it to its highest point of efficiency. Despite the praises of many boxing writers, who have been more than kind to me, I do not believe I have yet succeeded. I think that two more fights will see me at my peak. One of these, I expect, will be with Max Schmeling; the other with Jim Braddock.

"For several years in Detroit, before I became a professional boxer, I worked hard at different trades. I left school when I was a boy and decided to become a cabinet-maker. I apprenticed myself in a shop and learned to handle saws and lathes, hammers and chisels. I became fairly expert at wood-turning and joining and probably would have finished the study of my trade, if an urgent need for more money to help out at home hadn't caused me to look for more profitable work.

"I got a job on a bridge that was then under construction. I was only 16, but I was big and strong. I was a helper in a gang of structural iron workers and it was this hard labor that built up my back and shoulder muscles. Slinging that metal around was the hardest work I've ever done, but I don't regret it now.

"But my job was too uncertain. There were layoffs and I couldn't count on regular employment. A friend who worked in the Ford plant got me in there. I put in my eight hours daily and while the work wasn't as tough as my last one had been, it kept me on my toes.

"These jobs taught me how to use my hands and feet—in fact, my whole body—with a minimum of effort and a maximum of efficiency. It was this manual training that was so helpful to me when I became a boxer.

"There is a mechanical precision to boxing. Hitting a man with a left hook or a right cross is like using a hammer or any other tool. If you don't do it right, you botch the job,

[*Continued on page* 132]

Irrigate Your FROG FARM for Profits

by JOHN EDWIN HOGG

This giant bullfrog comes from the California desert where he and 2,000 like him were reised under artificiel conditions in an irrigated pond. Raising bullfrogs for table delicacies is fest becoming a major industry, with new farms cropping up daily in all states.

Circle—In this rearing pond the tadpoles are kept segregated from their cannibal parents. A wind mill pumps weter into the pond from a nearby irrigation streem, while the light bulb attrects insects to augment the food supply. Left—Here is a full view of Mr. Bishop's irrigated frog pond. Note how he has pleced it in a smell valley so thet the water flows through slowly. The fine mesh fence at the bottom keeps out snakes end animals, while the screen at top keeps out the birds which prey upon frogs.

A FEW years ago, had anyone suggested that bullfrogs might be raised in an irrigated, artificial ranarium in the desert, the idea would have been ridiculed. Yet today Frank Bishop, on his ranch in Santa Barbara County, Cal., has a going frog farm which would quickly revert to the desert were it not for the irrigation waters brought in for his citrus groves.

Mr. Bishop is an orthodox agriculturalist with long experience in irrigation. After a great deal of study, he decided an irrigated, artificial frog farm on his ranch should be just as productive as any natural pond established in Louisiana or Florida.

After obtaining all possible information, on the subject, he located his model plant in a small ravine in his orange grove, where irrigation water could be inexpensively pumped by windmill. Then he obtained his breeding stock.

All this was three years ago. Today Mr. Bishop estimates the capacity of his plant at 2,000 adult frogs per year. Thus his annual financial return approximates $100 for each $100 invested. Certainly no other form of domestic livestock raising can show a yearly return of 100 per cent on the investment.

One feature of his pond, is that it affords the frogs absolute protection against all their natural enemies. The cannibalism of frogs is averted by 12 ponds which carry the frogs from the spawn of the first pond through the succeeding tadpole stages to the adult ponds.

A fine wire mesh fence surrounding the

[*Continued on page* 138]

Air Corps Flash Bomb Lights Whole City for Night Bombers

THE cloak of night will provide no concealment for cities in the path of enemy bombing planes following the development of a 500,000,000 candle-power flash bomb by the U. S. Army Air Corps. The bombs, when dropped from a speeding airplane will illuminate the largest city in sharp detail.

In a conclusive demonstration, the 23rd photo section of the Air Corps took night pictures of San Diego's California Pacific International Exposition with a clarity equalled only by brightest sunlight.

One of the advantages of the flashlight bomb is that observers below will be blinded by its brilliance, while aircraft in the darkness above can pick off their clearly defined targets from perfect concealment.

Tachnical Sergaant Brees, left, and Lieut. Hobson are shown with two of the 500,000,000 candla-power flash bombs and thair aarial camara. Below is the San Diego Exposition, photographed at night with aid of a bomb. Nota clarity of detail.

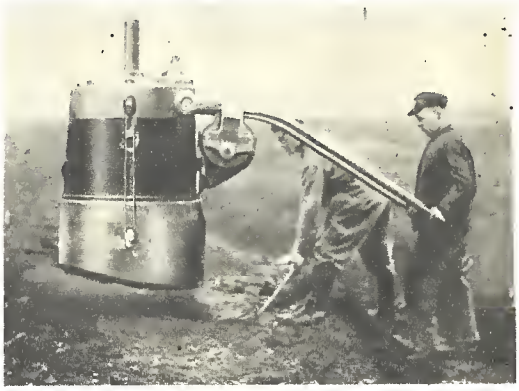
Electric Motor Is Dwarfed by Pea

Tha minute objects at which Wayne Hunter, Colton, Ore., is pointing is the world's smallest alactric motor. It makes 2,000 r.p.m. when powerad by a small flashlight battery.

AN ELECTRIC motor so small it is dwarfed in comparison to a common house fly has been advanced as claimant to the title of the world's smallest. The motor was made under a microscope lens and it is capable of 2,000 revolutions per minute when powered by a small flash light battery. It was built by Wayne Hunter, of Colton, Ore.

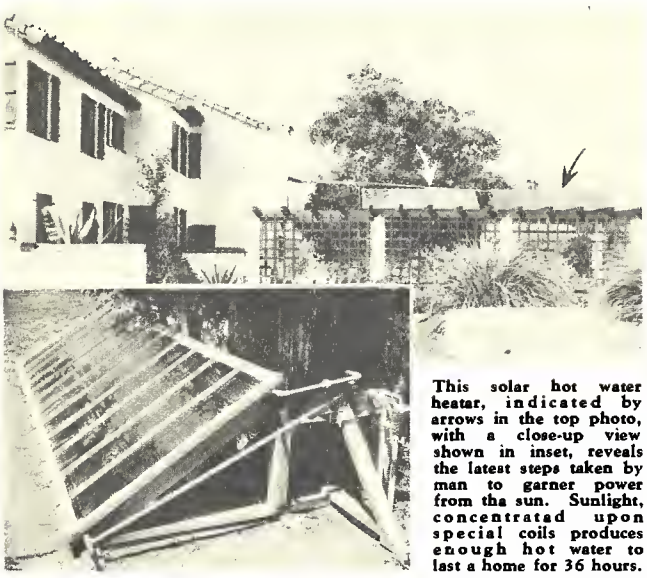
Mechanical Frog Packs German Road

A MECHANICAL frog which serves as a ram for packing the earth has been placed in service on German highway construction to eliminate costs of operating expensive steam rollers. An explosion of benzol in the half-ton frog lifts it above the ground, to drop with a terrific impact which sets off another explosion. Because of the slanting bottom, the machine moves forward in successive hops, packing the road as it goes.



This mechanical frog is used for packing grades on German highways. Successive explosions of benzol within the device keep it bouncing, each impact having terrific downward force.

Sun Bath for Special Coils Supplies Home with Hot Water



This solar hot water heater, indicated by arrows in the top photo, with a close-up view shown in inset, reveals the latest steps taken by man to garner power from the sun. Sunlight, concentrated upon special coils produces enough hot water to last a home for 36 hours.

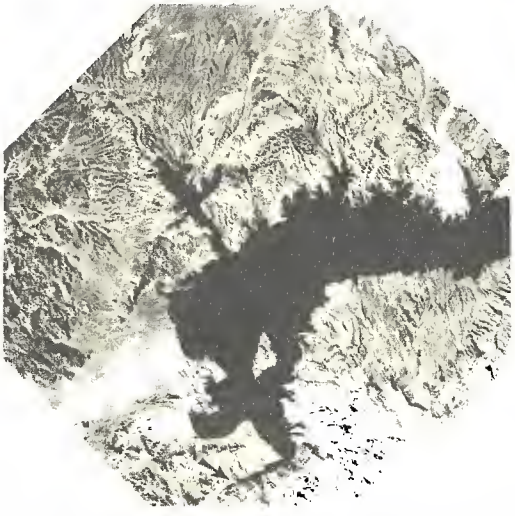
ADVANCING towards the time when man may draw all his power from the sun, a California manufacturer is already engaged in the production of hot water heaters dependent only upon the sun's rays for fuel.

The heating unit consists of a scientifically designed coil upon which the sun's rays are highly concentrated. Installed upon the roof of an apartment, it has the outward appearance of a sky light, and occupies no more room. Where roof tops are unsuited for such an installation, it may be placed in the back yard or atop an arbor.

The heated water is stored in a specially constructed boiler where it can remain without undue loss of temperature for several hours. There is no danger of fire.

Aerial Photo Scoffs at Man's Work

THE largest photograph ever taken, though it measures only 32 inches by 32 inches, has for its subject more than 200 square miles of rough terrain, including Boulder Dam and the huge lake above it. The photo was taken from a height of 20,000 feet with a Fairchild 10 lens camera, described in the November issue of this magazine. Later pictures will be taken to aid in the study of soil erosion.



One of the greatest engineering feats in the world, Boulder Dam, indicated by arrow, lower center, seems insignificant from 20,000 ft. The photo covers more than 200 sq. miles.

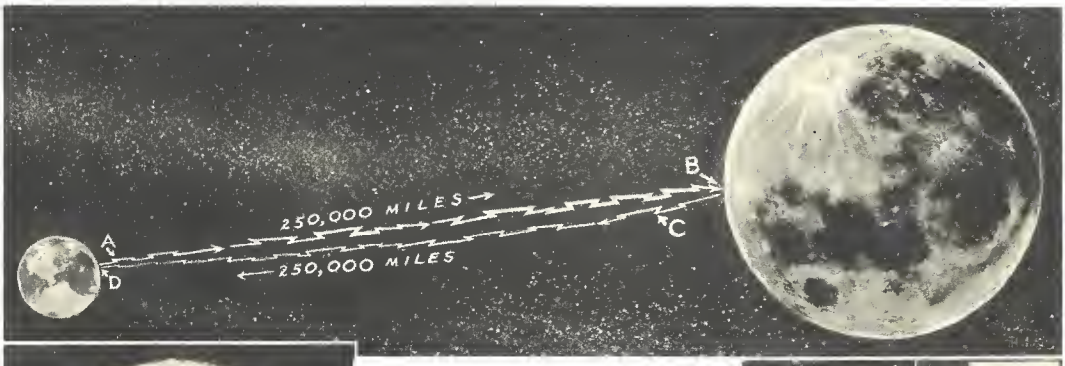
Car Bell Warns of Rail Crossings

Charles Adler, Jr., points out his device which flashes a light and rings a bell when approaching a grade crossing. The steel rails react on a detector installed on fender.

GRADE crossings, upon which more motorists meet death than from any other one cause, stand ready to give their own warnings through the medium of a device invented by Charles Adler, Jr., of Baltimore, Md.

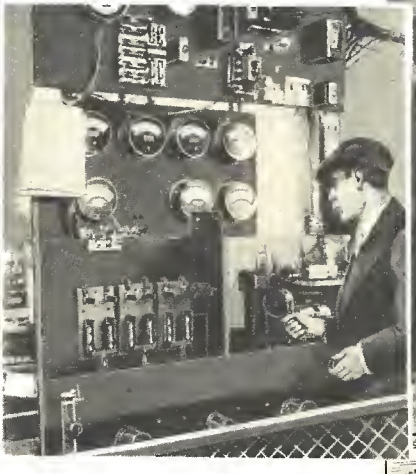
Steel rails imbedded in the road at grade crossings and other junctions react upon a sensitive detector unit mounted on the right front fender of Adler's car. The unit rings a bell and flashes a light when a crossing bridge is approached.

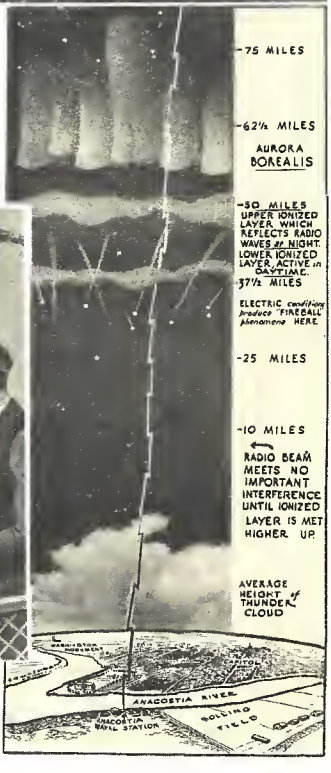
Aiming Radio Signals at the Moon



To reach the moon, radio signals from the earth must first pierce the mysterious layers of ions just below the aurora borealis level. Once beyond that, no obstacles are expected by Dr. Taylor until the atmosphere, if there is any, of the moon is reached. Already radio signals which have traveled one-fifth the distance to the moon have been heard.

Dr. A. Hoyt Taylor (above) of the Naval Research Laboratory at Washington, D. C., uses powerful radio transmitting equipment at right to bounce radio signals off the moon.




75 MILES
62½ MILES
AURORA BOREALIS
50 MILES
UPPER IONIZED LAYER WHICH REFLECTS RADIO WAVES at NIGHT. LOWER IONIZED LAYER, ACTIVE in DAYTIME.
37½ MILES
ELECTRIC conditions produce "FIREBALL" phenomena HERE.
25 MILES
10 MILES
RADIO BEAM MEETS NO IMPORTANT INTERFERENCE UNTIL IONIZED LAYER IS MET HIGHER UP.
AVERAGE HEIGHT of THUNDER CLOUD
ANACOSTIA RIVER
BOLLING FIELD
ANACOSTIA NAVAL STATION

Radio signals travel 186,000 mi. per sec. Time of radio echo is measured to get distance traveled.

RADIO signals from the moon *can* be heard, asserts Dr. A. Hoyt Taylor of the Naval Research Laboratory at Washington, D. C. The plan is to direct a short wave radio beam at the moon in such a manner that it will be reflected by the moon's surface to produce an "echo" wave, audible through powerful receivers on earth some three seconds after the 500,000-mile trip through inter-stellar space.

Already radio signals have been successfully sent distances of 50,000 miles, or twice around the world, by Dr. Taylor, using a 20-kilowatt transmitter and receiver.

Greatest of obstacles to moon-bound radio waves is the ionosphere, that strange atmospheric layer surrounding the earth fifty miles up during the night, and fifteen miles closer during the day. Like an invisible sphere of steel this mysterious blanket of ions bounces back to earth all ordinary radio waves, defying man's attempts to clear up interplanetary secrets.

Reports of long time radio echoes from European laboratories, some even exceeding the three second interval for the moon trip, give reason to believe that earth signals are already echoing back from some point outside the earth's atmosphere.

BEDDING DOWN the

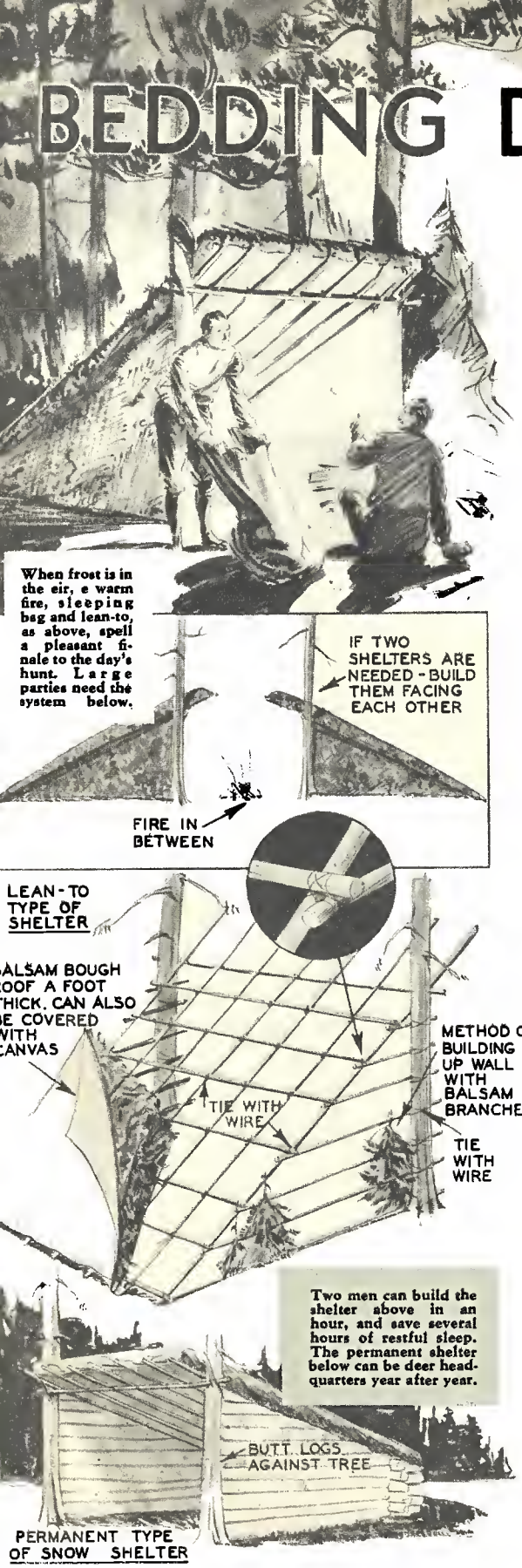
by ROBERT PAGE LINCOLN

CAMPING out in half-shelters, with a camp-fire in front of the same provides the greatest attraction the woods has to offer. Its fascination and pull on the imagination goes back to the time when, as boys, these same shacks and shelters were made, and you slept out in the approved style of Daniel Boone and Simon Kenton. Sleeping in a shack or cabin has an utter lack of imagination about it.

The bed proposition is not everything when one sleeps out in the open in the autumn and early winter. First there is need of a partial shelter, such as is offered by the so-called lean-to or Adirondack shelter. This is very simply made by placing a ridge-pole between two trees, and erecting poles at an angle up against the same, thereafter covering with a thick mat of balsam or spruce boughs to a foot or more in thickness. If there are four in a party, make two of them, one facing the other, the camp-fire being constructed in the center, thus providing heat and double windbreak for both camps. If there is a projecting front roof to the shelters, so much the better, in that the heat will be that much more conserved to the benefit of the sleepers.

The use of a tent as a shelter before a fire is hardly practical in cold weather. Wall tents are often used, in which case a simple little camp-stove can be used inside, with a four-inch collapsible stove-pipe providing an outlet for the smoke. Here, however, there is the same fault that is met with in utilizing a cabin, in that it overheats, and when the fire goes out, one is colder than ever.

A tent without a fire inside is a solution to the matter. The tent acts as a windbreak which is something to consider. It is a fact, however, that a tent can be about the coldest proposition that one could possibly meet up with. It conserves and holds the cold intact much as would an ice-box. It has nothing about it of especial value that the open-face lean-to, with its fire in front, does not offer, in spite of the fact that the lean-to does not shut out all of the wind. Shelters should always be placed, if possible, with their backs to the north


When frost is in the air, a warm fire, sleeping bag and lean-to, as above, spell a pleasant finale to the day's hunt. Large parties need the system below.
IF TWO SHELTERS ARE NEEDED - BUILD THEM FACING EACH OTHER
FIRE IN BETWEEN
LEAN-TO TYPE OF SHELTER
BALSAM BOUGH ROOF A FOOT THICK. CAN ALSO BE COVERED WITH CANVAS
METHOD OF BUILDING UP WALL WITH BALSAM BRANCHES
TIE WITH WIRE
TIE WITH WIRE
Two men can build the shelter above in an hour, and save several hours of restful sleep. The permanent shelter below can be deer headquarters year after year.
BUTT LOGS AGAINST TREE
PERMANENT TYPE OF SNOW SHELTER

DEER HUNTER

and west, from which the prevailing winds come in the late fall and early winter.

However, should a wall tent be included tent should not be too small, in fact should be something like 12′x14′ in size. Collapsible camp-stoves, if used, come in sizes ranging 10″x12″x18″ for small and 10″x12″x30″ for large. There are also types of charcoal burners to be used. All of these things depend upon ease of transportation to make their use possible.

Blankets in themselves are not especially worthy of consideration as a covering for cold-weather camping. Probably the warmest sleeping proposition we have is the eider-down sleeping bag. Eider-down is exceedingly light and fluffy, and is blown into tubes in the sleeping bag which prevents any possibility of the same becoming matted. An eider-down sleeping bag is exceedingly light, and has such heat-retaining possibilities as to make it suitable for sleeping right out in the snow. A close approach to the eider-down bag is the hare or rabbit-skin sleeping bag, often met with in northern Canada, the same having heat-retaining qualities of no uncertain order. Rabbit fur is especially notable in that it does not attract dampness with the ease of other materials, in fact this material, along with dry absorbent cotton and wool is probably the least susceptible to taking on dampness of any. Goose feathers, and various other feathers, including down, rank below these, but not a great deal. Both down and feathers have a tendency to become odorous, and need to be dried out occasionally, although there appears to be no method of taking the odor from the feathers.

[*Continued on page* 122]

Crisp days of moose hunting in New Brunswick call for warm sleeping bags during the cold, clear night spangled with frost crystals.

A thick blanket of snow on the ground makes a soft mattress for your sleeping bag. This hunter in the Adirondack mountains carries his sleeping bag and food on a toboggan, and sleeps outdoors without a tent.

BAGGED GAME—Its Care

Too many hunters, awaiting with watering mouths the long anticipated duck or pheasant dinner, have seen their feast consigned to the garbage can—spoiled. A few precautions suggested here will prevent such waste.

A BIRD in the pot is worth two in the hand. To the true game conservationist, good hunting not only means great sport, but good eating as well. And yet it is one thing to kill your game, and another to keep it properly in the field or at home until it is used. Every hunter will concede that the garbage can is no place for the game garnered by hard days in the field, and yet the number of game birds and chunks of venison so wasted is appalling.

All this could have been easily averted had the hunter availed himself of a few simple rules.

The greatest cause for game spoilage is a sudden change from cold to warm weather. Literally thousands of birds bagged during a cold snap go into the garbage can when soaring temperatures have their inevitable effect. Naturally, the bird which has been left hanging undrawn will spoil first.

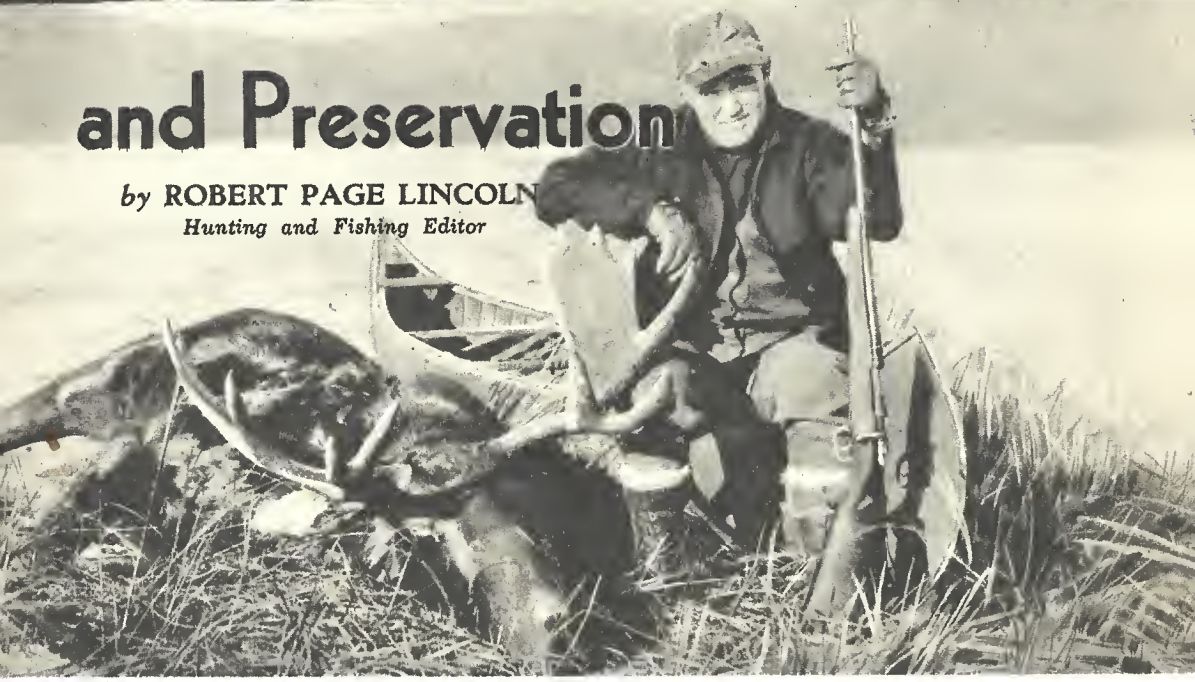
In the case of ducks, regardless of the weather, the first step is to open them and draw the entrails, hanging them afterwards by the head to keep if the weather is cold. In this manner, even in weather that is cool but not below freezing, the blood drains away from the meat of the breast, the choicest morsel of any game bird. Usually the entrail cavity is left unwashed, many hunters preferring to stuff the cavity with sweet dry hay

REMOVE ENTRAILS AND STUFF WITH DRY GRASS AS SOON AS POSSIBLE AFTER KILL
AT NIGHT BIRDS ARE HUNG UP BY THEIR HEADS
DURING DAY PLACE BIRDS INTO HOLE IN GROUND
PLACE BOARDS OVER HOLE AND COVER WITH CANVAS
WEIGH DOWN WITH ROCKS
3'-0"
BIRDS ARE PLACED IN BETWEEN DRY GRASS OR HAY

To care for your game while in camp, the first step is to draw the entrails and stuff the cavity with grass as shown in upper circle. At night the birds are hung up by their heads, out of the way of predatory animals, though if the nights are cold, they should be hung where they will not freeze. If the days are warm, the birds should be placed in an underground cooler. The cooler is dug three feet into the ground and thickly lined with dry grass. Another layer of grass is placed over the birds, and the hole is then covered with boards. Upland game birds, such as those shown in photo on left, will make a dish fit for a king.

and Preservation

by ROBERT PAGE LINCOLN
Hunting and Fishing Editor



Plenty of moose steak banquets are contained in this forest monarch, bagged in the wilds of New Brunswick, Canada. It is important, however, that the moose be promptly skinned, and the meat cared for in the manner described in this article.

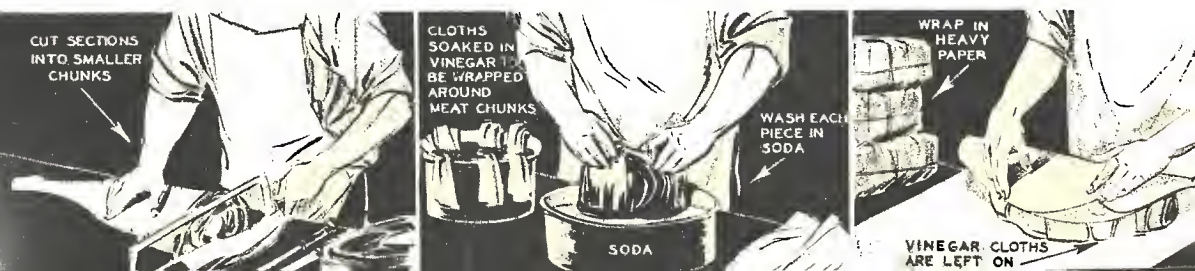
or grass. Another way is to wash away all blood with warm water and then apply a liberal sprinkling of soda. After ten minutes, the soda is washed out of the cavity, and any taint that might have been left by torn entrails is thus counteracted. The bird is then stuffed with grass and hung up by the head.

Game that is frozen, however, and which thaws out is almost sure to spoil and be unfit to eat. This applies to all manner of game, feathered or furred. Game that is frozen should stay frozen or it should be otherwise cared for. Duck hunters will find it an excellent idea to dig a hole in the ground, something like three feet in depth, and cover the bottom with a layer of hay or dry grasses. On these the ducks, with insides removed, and stuffed with hay, are placed, then covered with another layer of grass and boards. The top can now be covered with a piece of canvas. The birds are left thus during the day, but at night they are invariably taken out to be hung up by their heads, and returned to the hole in the ground the coming day. In this manner ducks can be kept without spoiling in spite of warm weather. Care should be exercised that no wild animals dig in to destroy the kill, a precaution that all hunters would take anyhow. If the nights are freezing cold, the game should be hung where it would be cool but would not freeze.

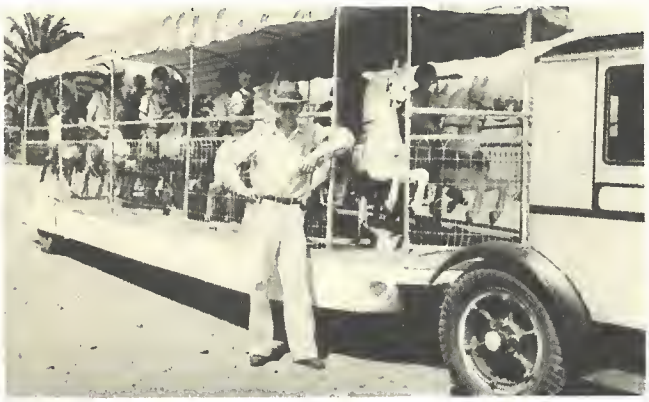
The practice of freezing ducks and game birds in the large refrigerators that are now so commonly in use, is followed up by a number of the hunting fraternity. This can be arranged right in camp or at home, whichever is desired. If in camp, only freezing weather, to the extent that the cleaned and prepared

[*Continued on page* 120]

If the deer season is warm, prepare your venison while still in camp. Divide the deer in sections, then cut into small chunks. Wash each chunk in a soda solution, and then wrap in vinegar soaked cloths. Wrap finally in heavy paper.


CUT SECTIONS INTO SMALLER CHUNKS
CLOTHS SOAKED IN VINEGAR TO BE WRAPPED AROUND MEAT CHUNKS
WASH EACH PIECE IN SODA
SODA
WRAP IN HEAVY PAPER
VINEGAR CLOTHS ARE LEFT ON

Merry-Go-Round Goes Sight Seeing in Latest Thrill Ride



This is a merry-go-round that goes places. A. Nelson of Sacramento, Calif., is shown with his trailer device which imparts the typical galloping motion to the wooden steeds as it is drawn along the highway.

THE old saying, "You can ride the merry-go-round all day and never get anywhere," has at last met its Waterloo. A. Nelson of Sacramento, Calif., is the man who dealt the time honored proverb the death blow by coming out with a ride that not only can go merrily around but can also travel cross country with equal merriment.

Sixteen merry-go-round horses, with the typical up and down movement of real horses, are mounted on a trailer drawn by a truck. The trailer wheels provide the power to gallop the horses, and special gears keep the pace steady no matter how fast the truck may be traveling through the street.

Cars Get Dual Role with Cameramen

HURRICANES, floods, community disasters, no matter where they may occur, the news reel cameramen are on the job, seemingly as though they had received advance information on the event.

The secret of their promptness, however, does not lie in advance tips but in fleets of cars specially equipped for service under the most trying conditions.

The back seats are removed, and the floors and sides lined with metal strips on which the cameras slide in and out. The top is reinforced to serve as camera platform, often while the car is moving.

Those news cameramen perched atop their Ford V-8 camera platforms are shooting a rural scene. Two hours later they may be 100 miles away braving a hurricane for new pictures.

Sailboat Tests New Streamlining

Sail boats, long thought to be already streamlined, are now being scientifically analyzed by C. T. Ludington. He is shown above photographing the smoke stream of a gaff rig type sail.

WHERE does the wind go after it leaves the sail, and why does a certain type of sail have more pull than others? These are the questions C. T. Ludington, Philadelphia aviator and yachtsman, is seeking to answer by a series of scientific tests on board a streamlined sailboat.

Using a movie camera, Ludington photographs the course of smoke blown across the sail. The moving pictures are then studied minutely to see in what way a change of sail or hull might be of benefit.

Recorder Maps Course Of Unseen Plane

A DRONING plane circling blindly through a thick fog, unseen by the tense observers below, despairingly wandered far off its course, only to crash in the wilderness of a mountainside when the gasoline supply was exhausted.

This and similar occurrences led to the invention of an amazing flight recorder which can pick up the sound of an airplane miles away, pass it through a series of tubes, wires, and intricate mechanisms to emerge as a moving dot of light on a scale map before the dispatcher. The dispatcher actually watches the plane's progress across the map, and can direct the pilot by radio whenever he leaves his course or passes beyond the airport.

The device is the product of Dr. Samuel Spitz, Southern California inventor, and it has been installed at the Burbank, Calif., Union Air Terminal.

Dr. Samuel Spitz is shown here operating his flight recorder which picks up the sound of a distant airplane and transforms it into a moving dot of light on the scale map shown at left.

Small Planes Get New Transmitter

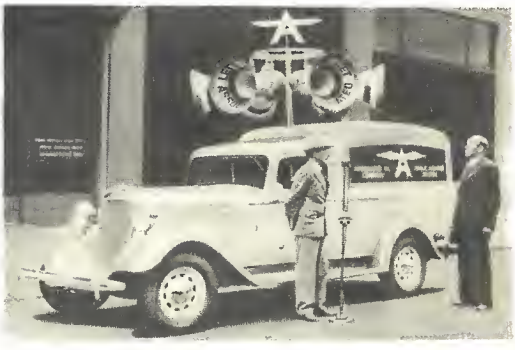
Here is two-way communication for private planes or small boats, the three type transmitter, top (voice, tone telegraphy or wave telegrephy), and receiver weighing less than 50 pounds.

TWO-WAY communication apparatus for privately owned planes, comparable in operation to that of the major air lines has been designed by Bell Telephone Laboratories for the Western Electric Co. The transmitter, complete with shock proof mountings, weighs but 11 pounds, and the entire apparatus weighs less than 50 pounds installed.

Mobile Amplifier Heard 5 Miles

CHAMPION hog callers who have sent their voices yodeling through valleys a mile away are compelled to step into the background when a new public address system, installed in a Dodge Panel truck, blasts out its announcements to a distance of 5 miles.

Six loud speakers are attached to a mast protruding through the top of truck. The mast may be raised to a height of 15 feet. O. M. Christiansen, sound engineer of the Frisco Telephone Equipment and Repair Co., designed the system.



If O. M. Christiansen, left, so desires, he can increase the amplification of his voice until it is heard five miles away. The mobile system tours through California and Oregon.

Mechanical Beach Comber Tidies Sand at Bathing Resort

This carpet sweeper on a giant scale is used to keep the beach at Santa Barbara clean. It scoops up the top layer of sand, screens out the rubbish, and sifts the sand out evenly.

NOT all beaches have convenient high tides to sweep over the sands, cleansing them of refuse left after a crowded day of picnics, and so there has been devised at Santa Barbara, Calif., a motor powered beach sweeper.

In action the sweeper resembles an animated squirrel cage with its series of rotating wire screens. A blade at the front shaves off the top layer of sand to a depth of 4 inches, the operation being similar to that of a mechanical potato digger. The rotating screens sift out all paper, glass, and even large rocks.

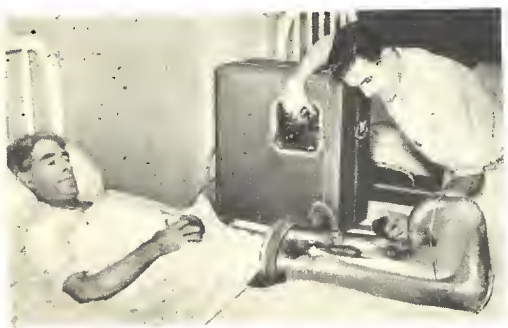
"Glass Boot" Averts Amputation

A MECHANICAL boosting station to aid the heart in forcing blood to afflicted limbs is expected by doctors at a Detroit, Mich., hospital, to reduce the number of amputations by 40 per cent.

In cases of crushed arms or legs, where veins and arteries are clogged and jammed together, the heart is unable to force blood through without assistance. Gangrene sets in and the limb must be amputated.

To assist the heart in combatting gangrene, the boosting station is fitted over the injured member like a glass boot. Then as the pressure within the boot is gently increased and decreased, the health giving blood is forced through the clogged veins.

It is planned to use the device for frozen feet, hardened arteries, and other cases where poor circulation might result in gangrene.



As the prassure inside this "glass boot" is gantly increasad and diminishad, it aids in pumping blood into the injurad lag. It is expacted to raduce amputations by 40 per cent.

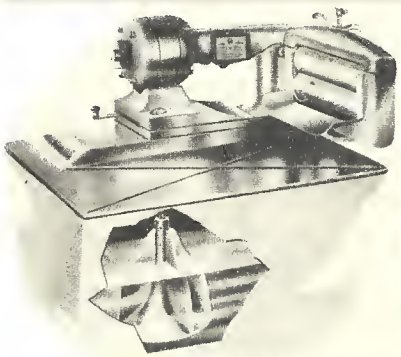
Radio Set Becomes Precision Tool

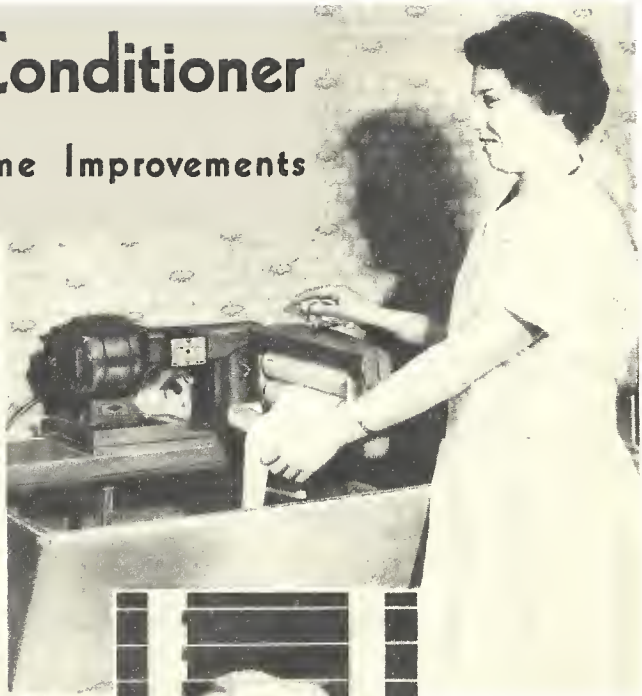
When a micrometer accurately measuring ten-millionths of an inch fails to detect any irregularity in a bit of mechanism, a radio set quickly picks it out. Tone changes reveal the flaw.

THE most delicate of micrometers having proved relatively crude when it comes to measuring the tolerances between the moving parts of an electric refrigerator rotary compressor, radio has stepped in to insure accurate measurement. After instruments have gauged a part to within ten-millionths of an inch, the operator dons ear phones to "listen in" as the part is revolved in a special device. Any minute error in concentricity is revealed by a change of tone.

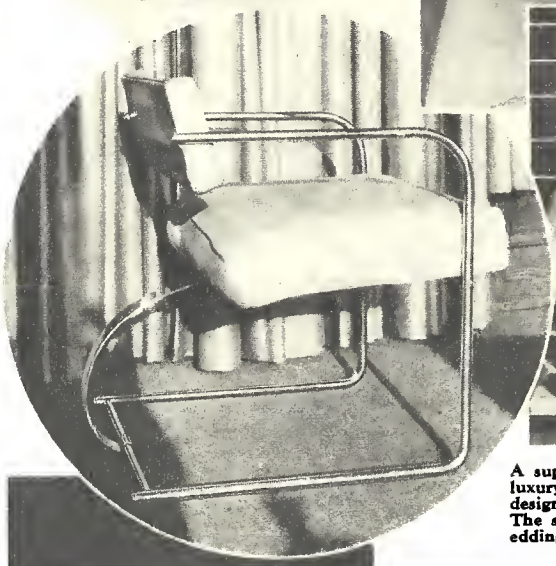
Midget Air Conditioner

Joins Parade of Home Improvements

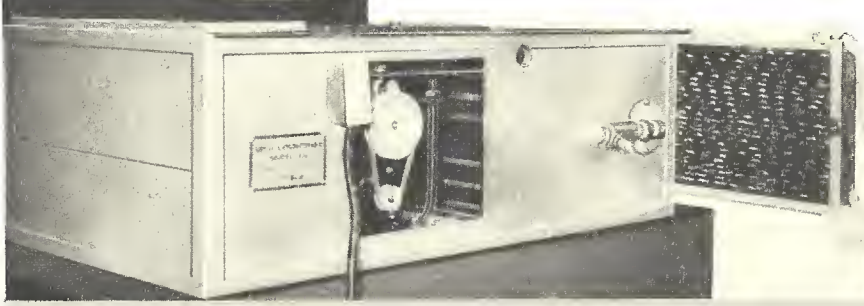




This portable washing machine, shown in two photos above, is designed to fit eny laundry tub or trey. The ¼ horse power motor, wringer, and gyretor ere ell of standard size. Economy of space end operetion are feetures of the unit. Left—This washable wool duster reeches all the crannies in Venetien blinds, close-set spindles, etc. The fingers are edjustable.

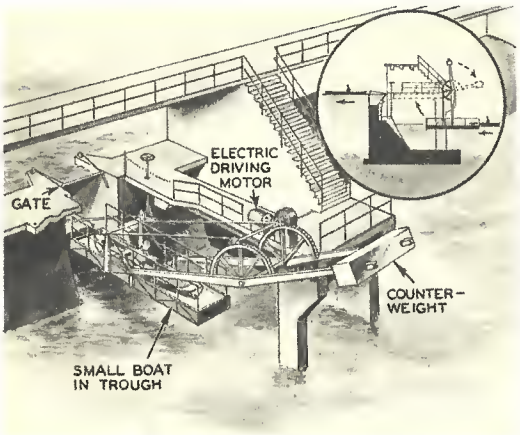


A supporting spring has given edded luxury to e tubular metal frame chair designed by R. J. Neutre, Los Angeles. The spring frees the freme of weight, edding to comfort and graceful design.



Housing experts are evidencing considerable interest in this compact air conditioning unit which received its first public demonstration in Chicago recently. The complete mechine, scarcely larger than a wardrobe suitcase, is capable of conditioning a six-room house. A constant flow of fresh air from outside the house is cleaned and passed into the rooms. In cold weather, it absorbs the air already in the room, cleans it of dust, grime, and pollen, and returns it in fresh condition without excessive loss of heat. As shown by the young lady above, the filters are easily removed.

German River Dams Will Have Elevators for Small Boats



A cross-section of the boat elevator for river dams now under construction in Germany. Inset shows position of the elevator as small boats enter or leave the loading trough.

CRUISING freedom for small boats in dam locked rivers is about to be offered in Germany by means of a series of boat elevators at each dam, the first of their kind in the world.

The small boat elevators are to be automatic, the boat traveler merely propelling his boat into a trough, inserting a coin in the slot, and being raised or lowered over the dam by electric motors. The boat trough, or loading platform, is suspended from long arms and is balanced against a counterweight at the other end. The motor swings the arms upwards, and when in position at the top of the dam the trough opens, and the boat passes through. The process is reversed for descending. The boat elevator can be used on dams of any height up to 40 feet as the arm levers can be lengthened or shortened to meet the requirements. The first of the elevators will be completed this fall at Hausen-on-the-Main.

Fishing Records Fall This Season

ONE of the greatest sportsmen's fishing seasons in history was marked up this past summer with record breaking catches reported from all parts of the country. Francis H. Low, Woodmore, Long Island, came in with the largest fish ever caught in the world on rod and reel, a 1,100-pound Mako shark. Later the world's record white sea bass, weighing 52½ pounds, was caught on a 3-6 line by Wilbur White off Catalina Island.

Left—Here is the largest fish ever caught by rod and reel in the world, a 1,100-pound Mako shark, caught by Francis Low, shown holding fin. Right—This little girl is admiring the world's record-breaking sea bass which weighed 52½ pounds.

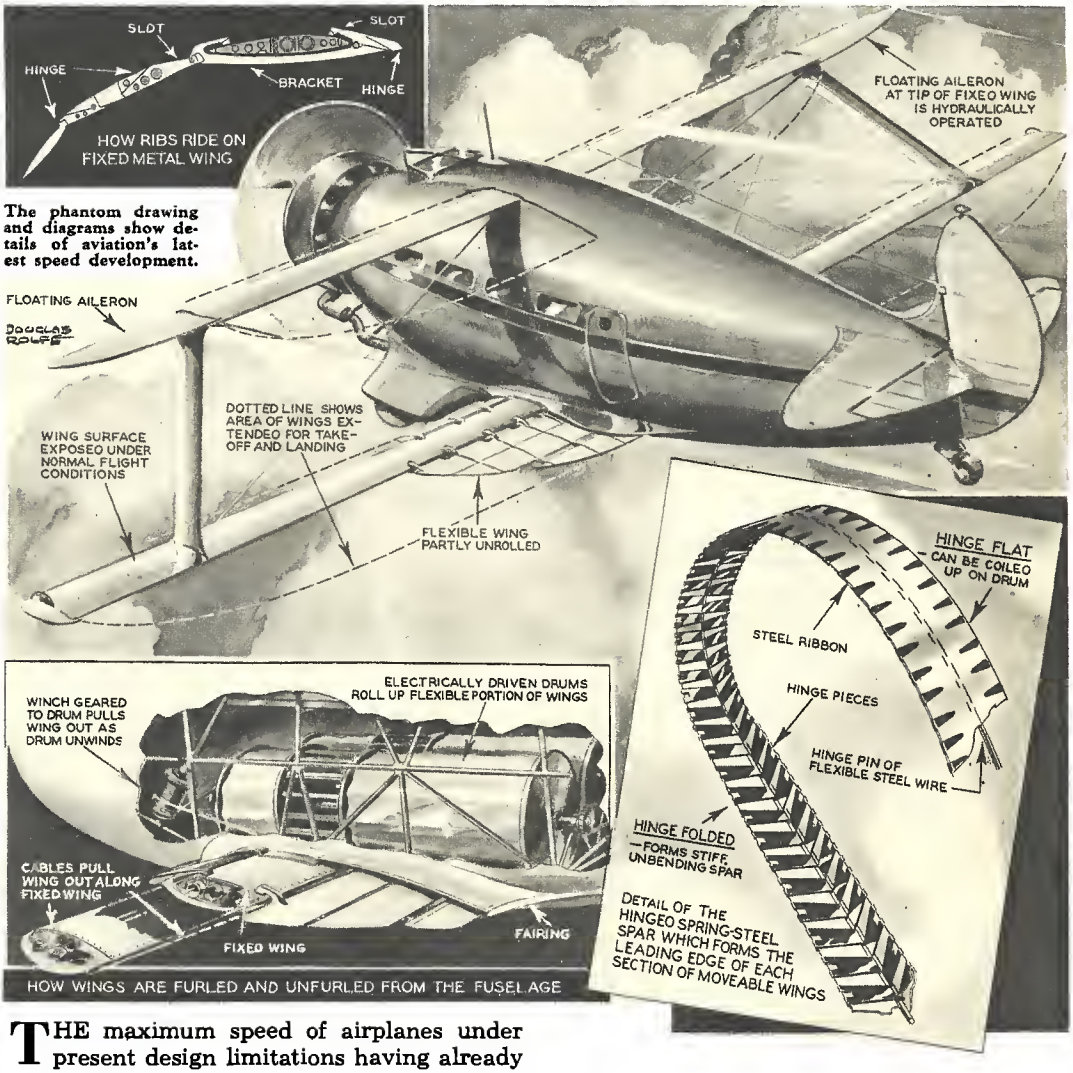
Hydraulic Jack Has Bumper Lift

This new style hydraulic automobile jack can raise and lower a car in less than a minute. It raises the car by the bumper, and is designed for the modern streamlined models.

THE principle of the hydraulic hoist has been embodied in a new bumper lift jack which has a capacity of 3,000 pounds and a lift of 17 inches. It is slightly over 2 feet high and is especially designed for streamlined cars with overhanging bodies and knee-action wheels.

A hook midway down the jack is placed under the bumper arm and then a few easy strokes raises the wheel from the ground. The hook is easily lifted into position by hand, making it unnecessary to pump the jack into position.

Speed Plane Sprouts Safety Wings


SLOT
SLOT
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HOW RIBS RIDE ON FIXED METAL WING
FLOATING AILERON AT TIP OF FIXED WING IS HYDRAULICALLY OPERATED
FLOATING AILERON
DOUGLAS ROLFE
DOTTED LINE SHOWS AREA OF WINGS EXTENDED FOR TAKE-OFF AND LANDING
WING SURFACE EXPOSED UNDER NORMAL FLIGHT CONDITIONS
FLEXIBLE WING PARTLY UNROLLED
WINCH GEARED TO DRUM PULLS WING OUT AS DRUM UNWINDS
ELECTRICALLY DRIVEN DRUMS ROLL UP FLEXIBLE PORTION OF WINGS
CABLES PULL WING OUT ALONG FIXED WING
FIXED WING
FAIRING
HINGE FLAT — CAN BE COILED UP ON DRUM
STEEL RIBBON
HINGE PIECES
HINGE PIN OF FLEXIBLE STEEL WIRE
HINGE FOLDED — FORMS STIFF, UNBENDING SPAR
DETAIL OF THE HINGED SPRING-STEEL SPAR WHICH FORMS THE LEADING EDGE OF EACH SECTION OF MOVEABLE WINGS

The phantom drawing and diagrams show details of aviation's latest speed development.

HOW WINGS ARE FURLED AND UNFURLED FROM THE FUSELAGE

THE maximum speed of airplanes under present design limitations having already been reached, the further development of the airplane as a high speed transport or instrument of war is dependent on the discovery of something entirely new in design.

Keenly aware of this, aeronautical engineers are attaching great importance to the development of a plane in France which will permit the pilot to roll up three-quarters of the lifting surface of the wings after the plane has reached its flying level.

The new wing invention of M. Jacques Gerin, which he calls "Varivol" is based upon the flexibility of the spring steel ribbons which form the hinges between the sections making up the folding portion of the wing. As the electric motors wind the sections over the drums, the hinges open up flat and flexible. The hinges fold as the wing is extended, forming a stiff, unbending spar.

The lifting surface needed by a plane in landing or taking off being many times greater than is actually needed for safe and economical air travel, the advantages of the invention can readily be seen. It must be remembered, too, that the lifting surface of a standard plane actually serves as a drag when the plane levels off.

Freed of drag, the plane is expected to pierce the air on its thin dural wings fast enough to form an entirely new conception of speed.

CARE and Feeding

THIRTY-FIVE years ago little thought was given to the feeding of dogs. Cities and towns were not so heavily populated. There were few if any automobiles and dogs were permitted the run of the town. They had exercise in abundance, which is so necessary to a dog's health. The local butcher always had a choice piece of chuck meat, liver or heart for the dog at little or no cost. These prime bone and body builders along with plenty of table scraps and milk, kept pets in the best of condition.

Today we have an entirely different situation. Automobiles and the restrictions of city life have made the dog practically a confined animal. To offset his lack of freedom, the dog must have proper care and feeding.

Manufacturers of dog foods have for some years made a scientific study of balanced rations necessary to condition and promote health in the dog. They have been highly successful in their achievements.

One can procure at the drug store, grocery, or department store, in bulk package or can, a complete meal for the dog at a reasonable cost.

Much depends on the care given to dogs. Proper quarters should be provided. If an outside kennel is to be used see that it is somewhat above ground and that it will be dry in case of rain or snow.

Grooming plays a very important part in the dog's health. It takes but a few minutes each day to comb out the snarls and dead hair, and it also gives the owner a chance to keep a close watch for fleas, ticks, eruptions, signs of ear canker or any other possible start of a disease.

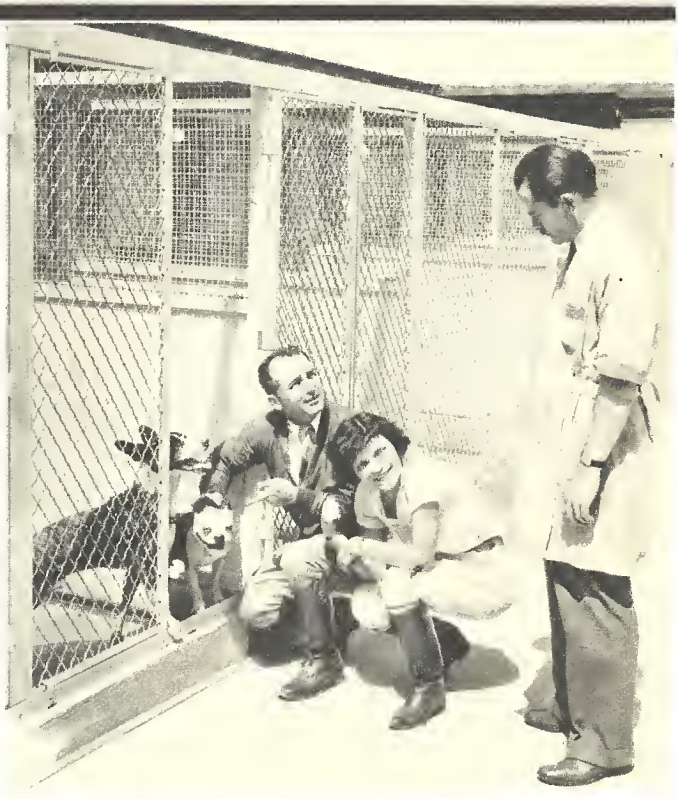
Exercise is an all important part of a dog's life, and few get enough. For the person who has limited yard space, there are two methods available for a moderate amount of exercise.

Can a dog think? The answer is yes. Dr. Orlando Scott conducted a test before a group of scientists with his psycho-galvinometer on Snoozer, a performing collie. The test, the first ever performed on an animal, showed that Snoozer had the intelligence of a 12-year-old child.

# of YOUR DOG *by* EARL CRAIG

One is to build a pen say 10'x20' and six feet high. The other method is to run a wire between two posts or trees and have a ring on it. This will answer the purpose for small dogs, but I do not recommend it for the larger types. Quite frequently we see a deformed dog with a misplaced shoulder, undoubtedly caused by constantly lunging at the end of a chain. With an automobile in nearly every family and with the wide open spaces within a few minutes ride, if one would take the dog out for a thirty minute run, he will derive more actual benefit than if he were walked on a leash all day.

The problem of feeding is not a difficult one. It merely requires a little knowledge of foods and their values to get perfect results. Perhaps the mineral sources should come first, followed by, why your dog needs these minerals. Here they are:



If space permits, build an outdoor pen for your dog to give him fresh air and some exercise. These are the pens in which Trainer Rennie Renfro keeps dogs for the movies.

Your Dog's Diet

Tbs following feeding schadule for dogs et verious ages is suggested. Prepered foods in can or bulk can be used as the basis of a wall-balanced diet from puppybood on. Puppias are usually fad three times a day. After ons year e dog sbould be fed just once a dey in the evening with e little milk in the morning, if he does not get much exercise.

From four to six weeks feed bitch's milk, raw, whola cow's milk, cod liver oil (via tbe dem) end rew screped beef.

Six to Eight Weeks—Bitch's milk, night only, cow's milk, cod liver oil (emulsion), bread crumbs, (whole wbeet), rew screped beef, breakfest food, tomato juice.

Two To Three Months—Cow's milk, cod liver oil (emulsion), butter, bread crumbs, raw cbopped beaf, lemb sbank, meet broth, braekfast food, tomatoes, crackers (errowroot, grabam, soda, educator), berley.

Three To Six Montbs—Cow's milk, rew cbopped beef, cookad beef or lamb, lemp chop, meet fet, selmon, barley, breed, creckers, tomatoes, onions, spinecb, greens, fruit, macaroni, eggs, liver.

Six To Twelve Months—Cow's milk, raw beef, cooked beef or lemb, all glendular organs, fish, eggs, bread, all vegetables, puppy biscuit, cod livar oil, barley, meceroni, rica, fruit.

Grown (working)—Fifty per cent meet daily, ell vegetables, ell starches, ell greens, bread, dog biscuit, milk, eggs, fish and fruit.

Grown (pets, nonworking)—Thirty-five par cent meet daily, milk, fish, eggs, all vegetables, all greens, dog biscuit, breed, fruit.

Protein is found in meats, fish, poultry, eggs, cheese, cocoa; fats in butter, cream, milk, meat fat, egg yolk, cheese, cocoa, cod liver oil; iron in spinach, dates, cereals, meats; phosphorous in milk, eggs, cheese, meat; iodine in fish and cod liver oil; carbohydrates in rice, macaroni, bread, cereals, dates; and calcium in milk, tomatoes, leafy vegetables, cheese, cocoa, spinach, raw meat.

Your dog needs protein to build and repair tissues; fat to make heat and energy; iron to tone the blood, phosphorous to nourish muscles and nerves; iodine to regulate the thyroid; carbohydrates to furnish muscular energy; and calcium to form bone and teeth. Hence we see the importance of minerals.

As to the necessary vitamins that goes to make up the dog's diet, we have five A, B,

[*Continued on page* 126]

"See the World On a Tricycle," No Joke for Canadian Vets

Tricycle sightseers are these three Canadian war veterans bound for the Paris Exposition. From left to right they are J. J. Hugg, P. Caron, and J. B. Burton, all of Montreal.

SEEING the world on a tricycle is not quite as improbable as it may seem, as three Canadian war veterans of Montreal are effectively demonstrating.

Starting recently from their home city, the three veterans began pedaling their way to the Paris Exposition on a tricycle of their own construction. Their route is taking them through the northern part of the United States to the Pacific coast where they will embark at Vancouver, B. C., for the Orient. They average between 75 and 80 miles a day.

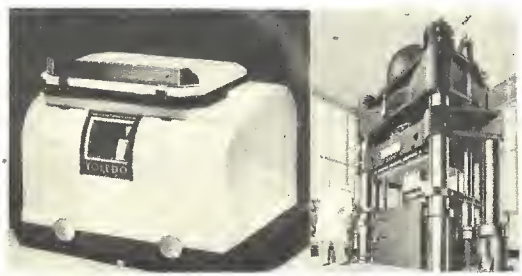
The tricycle is a sturdily built affair, the chassis of which supports a miniature cabin containing all their personal effects.

Field Expands for Molded Plastics

MOULDED plastic equipment for home and factory will soon be found serving in an ever increasing number of functions as a result of the recent development by General Electric Company of a gigantic press now being used to produce the largest plastic moulding ever made in commercial quantities.

The press for producing the moulded case, used to house the new Toledo Plaskon scale, stands 22 feet high and weighs 89,000 pounds. The mould weighs 14,000 pounds. The substance used for making the case is a urea formaldehyde plastic, pure white in color and unusually light and durable.

Now that the way has been paved for moulding large plastics, it is expected that many manufacturers will step into the field.



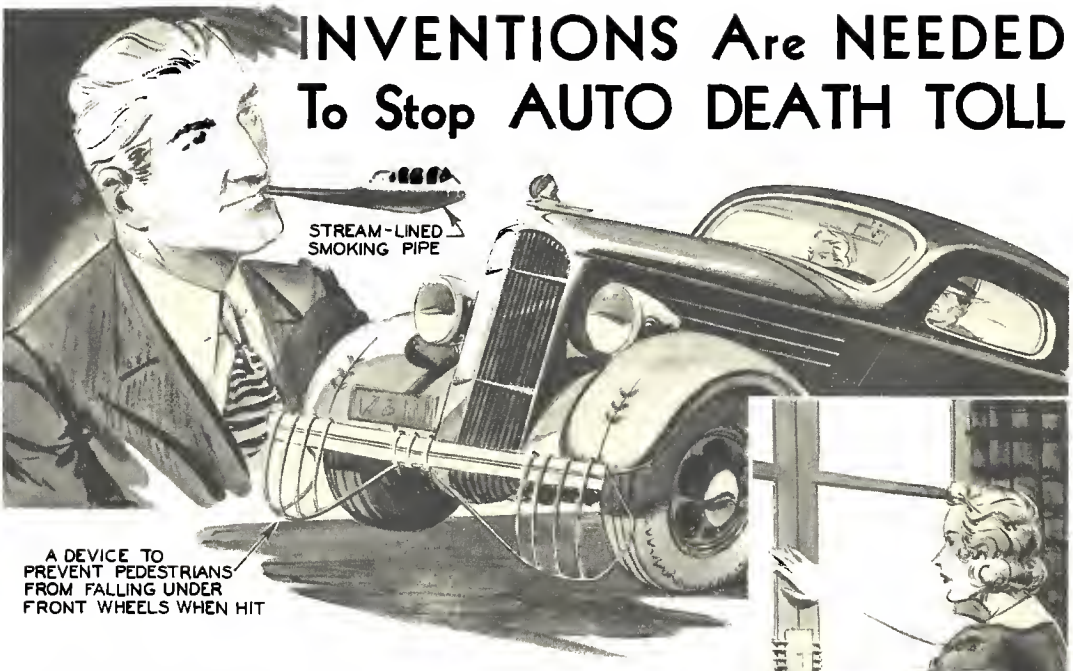
This gigantic press and mold, weighing more than 100,000 pounds, is used to produce the 8½ pound case for the scale at left. It is the largest plastic mold made commercially.

Poultrymen Discover New Vitamin

E. L. R. Stokstad, writing, and H. J. Almquist discovered the new vitamin, K, in alfalfa, kale, cabbage, and lettuce while they were seeking a cure for internal bleeding in chickens. It is hoped it will cure human hemophilia.

"ALL we know is that it is beneficial to chickens." Thus modestly did H. J. Almquist and E. L. Stokstad of the Poultry Husbandry Department of the University of California, announce their discovery of Vitamin K, a discovery which may save the lives of hundreds of people afflicted with hemophilia. Hemophilia is a bleeding disease, and the scientists discovered the cure while treating chickens for internal bleeding.

INVENTIONS Are NEEDED To Stop AUTO DEATH TOLL


STREAM-LINED SMOKING PIPE
A DEVICE TO PREVENT PEDESTRIANS FROM FALLING UNDER FRONT WHEELS WHEN HIT
AN AUTOMATIC SNAP CATCH THAT WILL LOCK WHEN WINDOW IS CLOSED

With auto accidents more frequent than ever before in history, legislative approval of any invention that will reduce the death toll should bring fame and a sizeable fortune. For free advice write to the Patent Editor, Modern Mechanix Publishing Co., Minneapolis, Minn., enclosing a stamped addressed envelope.

AFTER three or four years of comparative quiet, the Patent Office is once more busy as inventors rush to protect their ideas. Within the next few years America will absorb and use many thousands of new ideas, big and little.

The ever-increasing number of fatal automobile accidents in this country is something that demands the attention of every inventor. Although a number of devices have been patented to prevent pedestrians from falling under the front wheels of a car, the right article has not yet made its appearance. When it does, practically every state in the Union will demand it as standard equipment, just as New York State has this year required that every new car carry safety glass on all windows.

Perhaps the greatest menace to driving safety is the careless or intoxicated driver who travels just as fast as his modern, high-power car will carry him, without regard for traffic laws or the rights of others. Some day —somewhere—an inventor will carve his niche in the hall of fame by building a robot driver. This mechanical device would take the dangerous "human element" out of driving, just as rails and automatic block signals have reduced railroad accidents. Whether this will be a photo-electric control following guide lines painted on the streets, a magnetic unit responding to metal imbedded in the pavement, or simply a speed control device that will close the throttle whenever roads become too bumpy for ordinary speeds, remains to be seen.

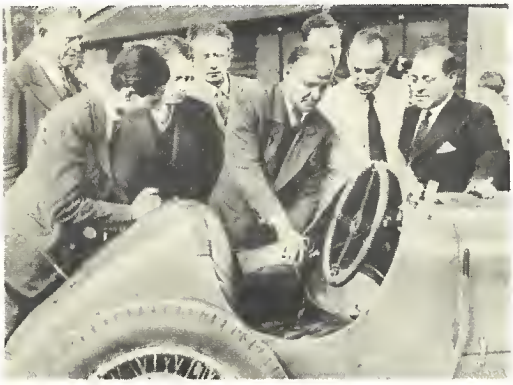
Many traffic accidents occur because each driver says "I thought the other car would stop." Who can work out a gadget that will be clearly visible yet not unsightly, to indicate just what the driver of that car intends to do? This should tell whether the driver will stop, slow down, speed up, turn right, turn left, or continue at his present speed. The indications should be visible from all directions, and not confusing.

Minor accidents sometimes occur because the driver cannot see the right front fender from the low seat of a modern car. An improvement on the fender guide in use today should find a ready market.

Some simple switch, secret or otherwise, combining the safety of a combination lock with the convenience of a key and installed in

[*Continued on page* 142]

Water Vies with Gasoline as New Motor Fuel Passes Tests



Baron Alfred Coreth, German scientist, is shown pouring water into the gas tank as he demonstrates his new fuel to English engineers. The fuel is made of water and alcohol.

SERIOUS rivalry is being offered the corner filling station by the kitchen water faucet of Baron Alfred Coreth following his invention of a new fuel for his automobile.

The new fuel, called Corethstoff, after its inventor, is composed largely of water and raw alcohol, and can be used in any type of internal combustion motor without alteration of engine or carburetor. It is not only cheaper to produce than gasoline, but goes 20 per cent farther as well, the inventor claims.

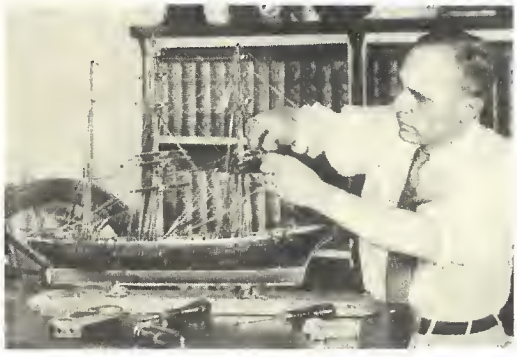
Because of its non-explosive and practically non-inflammable qualities, Corethstoff is being considered as an airplane fuel.

Tropic Hats Get Aluminum Lining

A TORRID sun beating down upon the tin roof of a building in Egypt has led to a new style in tropical helmets. Dr. G. P. Crowden, London, Eng., found that an aluminum lining reduced the temperature several degrees. Then he tried an aluminum foil lining in his helmet. It reduced the temperature 20 degrees.

Barrister Joins Workshop Fans

SUPREME Court Justice George E. Brower of New York has joined the growing throng who find rest and relaxation as well as high grade entertainment in their home workshops. He finds that delicate woodworking is the best tonic after a hard day in the court room, and specializes in building model ships. He recently built a three-masted square rigger.



From musty law books, Supreme Court Justice G. E. Brower turns to building models of sailing ships famous on the Seven Seas. He is shown above with a three-masted square rigger.

Shocked Worms Make Fishing Easier

When a few volts of electricity tickle the stomachs of angle worms, they pop right out of the ground, as the young lady above demonstrates. Back-breaking digging is avoided.

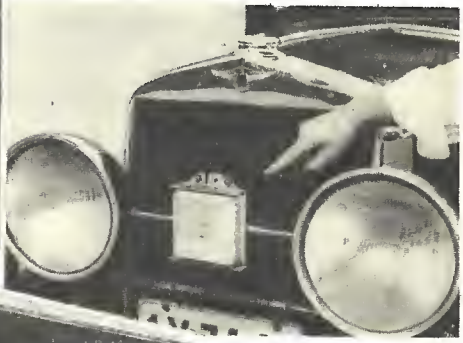
FIRM in his conviction that fishing should afford nothing more nor less than a complete rest, B. L. Nutshing, of San Francisco, has devised an electric angle worm accelerator to avoid digging worms. A metal rod is attached to electric wires and thrust into the ground. Immediately the worms come to the surface. He only has to pick them up.

Shiftless Jitney, New Fire Truck, Rail Bus Greet Public

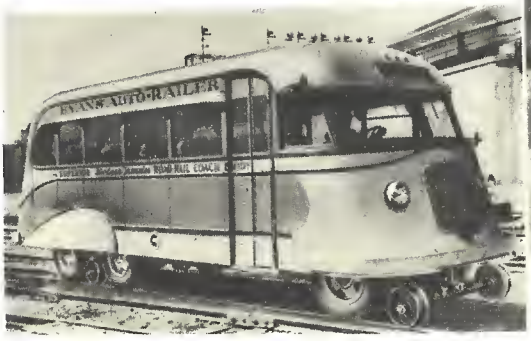
This exposed speedometer is believed by its English Inventor to make the driver speed conscious. Speeders do not like their excassive rete established so publicly

Geer shifting is all eutomaric in this ultre-modern Naw York City bus. Step on the ges and tha clutch engeges. At the proper moment the ges feed is raleesed, and the bus promptly shifts gears.

This 750-gallon pumper is the first enclosad fire truck built in the U. S. Everything carriad on the old style truck is included in this, and in addition, the men are protacted from the weether after working in fierce heat. Below—Ratracteble flange wheels convart this bus into a reil car in one simple movement. The retractable feature enables the bus to travel tha highways without ramoving its railroad wheels.



Predictions are that chime toned bells such es the one shown ebove will replece auto horns soon. Big cities are alreedy protesting tha use of noisy horns. Laft—The sides of this English bus consist of a telescopic sliding cover. It cen be converted from an open to closed bus in a very few minutes.



Here is somathing new in stetion wegons. Mounted on a Chevrolet chessis, the wegon can seet ten pessengers comfortably. The seats may be removed, leaving e penel truck.

The Story

FROM JUNGLE

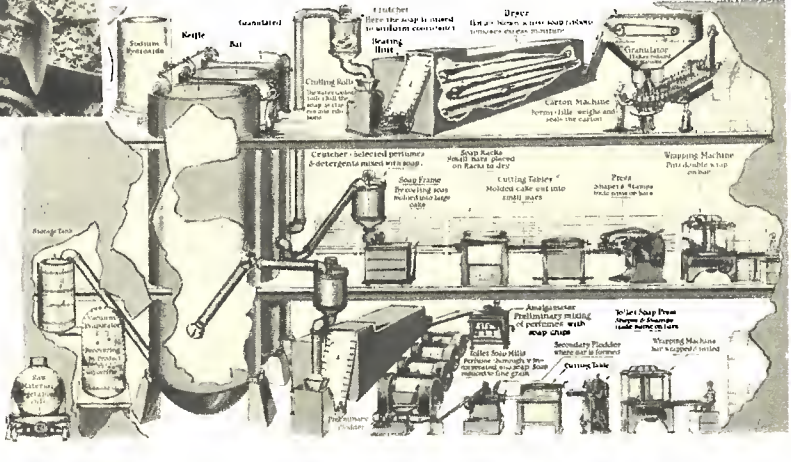
THE white meat of the cocoanut from tropical islands of the South Seas, oil from the cotton fields of the South, thyme and other herbs from shady gardens, soda and potash from desert mines, flowers from the flower-fields of Europe—these are the principal ingredients from which modern soap is made.

The origin of soap is lost in antiquity. Buried in the flaming lava of Vesuvius a soap maker of Pompeii met his death. Centuries later excavators found his shop with bars of soap in their original moulds. Even that is not the beginning. In 600 B. C. the Phoenicians made soap as a commercial product, and it was doubtless used long before that.

What is soap? Stated simply, ordinary soap is the result of chemical combinations of fats with soda or potash. Much more than this, though, enters

Tramp copra traders, plying their boats in the mystic isles of the South Seas, come first in the romance of soap. In this scene the natives are gathering cocoanuts for the trader.

Here the dry cocoanut meat, called copra, is being unloaded in a U. S. harbor. From the docks it is taken to the extraction plants.



This diagram shows the steps in the operation of a modern soap factory. Vat 1 produces the toilet soaps being made on the lower floor; vat 2 yields the laundry soap being made on the second floor, and vat 3 produces the soap flakes on top floor.

# of Soap

TO HOME

by
RALPH BAKER

King Cotton plays a highly important part in the story of soap. From the cotton seed comes a cleansing oil which surpasses the unguents of ancient times. Here is cotton on a plantation in the deep South.

into the modern manufacture of soap.

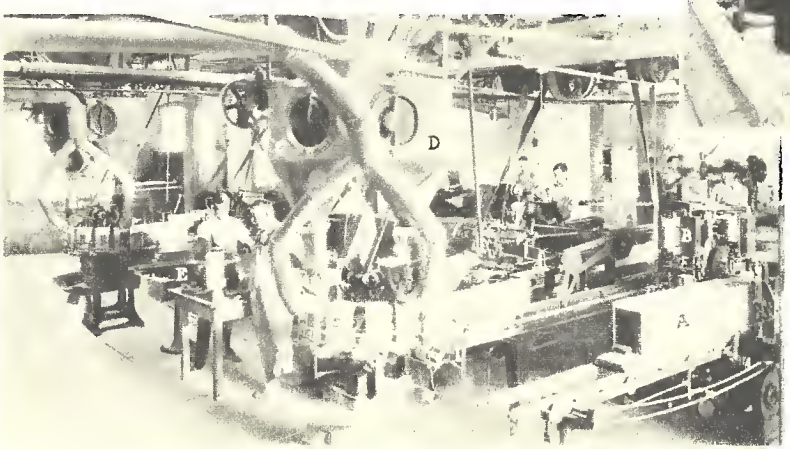
Cocoanut is one of the chief ingredients used. The copra, or dried cocoanut meat, upon arriving from the South Sea island, goes to crushers where it is ground, reducing it to a bran-like substance. Then it is ready for the oil extractors, where the oil, nearly two-thirds of the entire bulk, is pressed out.

From storage tanks the oil is pumped to the refinery, where it becomes a pure, sweet salad-type oil, some of which is sold to manufacturers of vegetable foods.

The oil is next pumped to soap kettles where it is saponified by adding a solution of sodium hydroxide, and boiled with live steam entering the kettles through pipes. Imagine twenty or thirty such kettles three stories high.

[*Continued on page* 130]

Nearly two-thirds of the weight of copra is oil, which is extracted and stored in these tanks. One soap plant uses more than 250,000 cocoanuts daily.



The flat soap cartons, A, are opened into boxes by machine B, and are filled with soap flakes as they pass under the hopper D. The flakes are shaken down on the rough track leading to hopper C, which then fills up the boxes again according to correct weight.

Diesel-Electric Locomotive Flashes To New Power Heights

This is the "Super Chief" of the Santa Fe lines, most powerful Diesel-electric locomotive of this type ever built. It was placed in operation recently between Chicago and Los Angeles, and has a top speed of 98 m.p.h.

THE nation's most powerful Diesel-electric locomotive, the "Super-Chief" has been introduced to the traveling public in Chicago, and is now flashing between that city and Los Angeles on regular scheduled runs of the Santa Fe lines.

The giant power plant is 127 feet long and weighs 240 tons. Into it has gone all the improvements Diesel engineers have devised to date to make it the most powerful of its kind in the world.

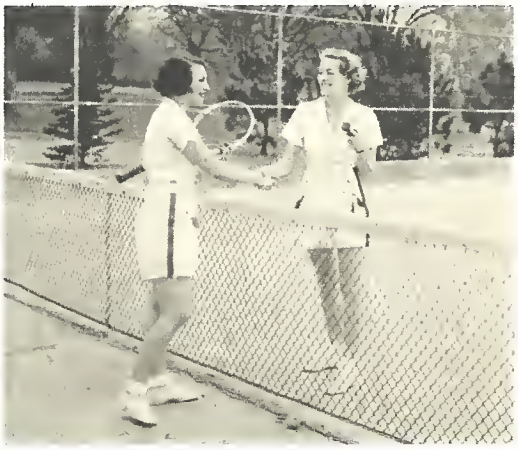
Viewed from outside the locomotive has the appearance of a streamlined coach. Gone are the smokestack whistles, and bells which ornament the top of ordinary engines. Even the drive wheels are enclosed to reduce air resistance. It has a rated top speed of 98 miles per hour.

Convertible Bicycle Shifts Gears

TWO pair of handlebars and a 12-speed cyclogear on a new type of bicycle makes it instantly convertible into either a racing or touring machine. The cyclogear is operated by a twist of the controls attached to both the conventional handlebars and the racing bars. The rider shifts gears as his speed increases just as does the driver of a car.

Here is a bicycle which shifts gears just like a car. It has two handlebars, one set for touring and the other for racing. A 12-speed cyclogear is operated by twisting the grip control.

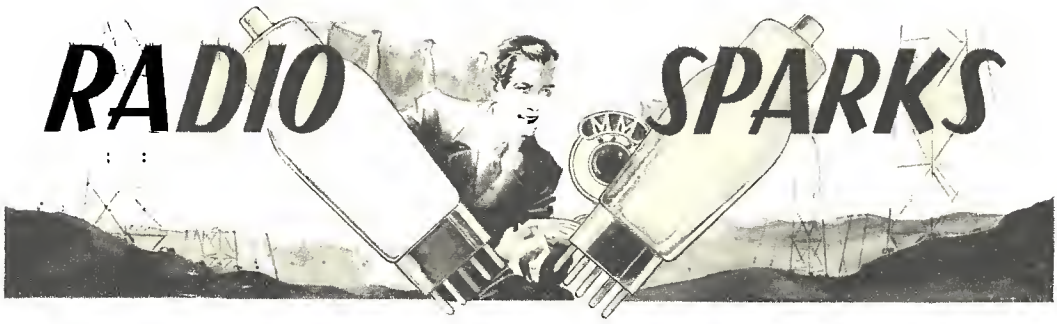
Metal Tennis Net Retains Tautness



This all steel tennis net has a metal center tape to hold it at official height, and a canvas top to give natural action to a net ball. It cannot stretch and lower the net.

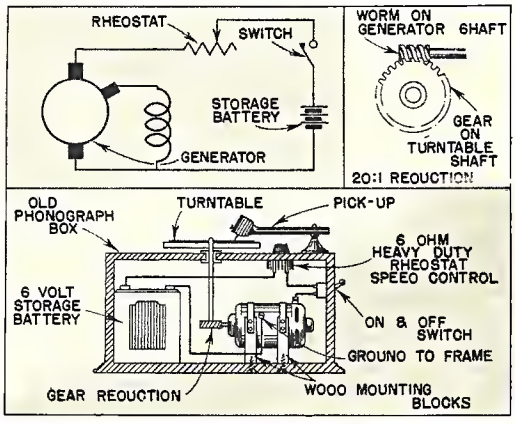
SAGLESS nets made of metal are the latest improvement in tennis, a game which is now rated as one of the most popular in the country. The entire net is made of woven steel wire, with a metal center tape to hold the net at official height.

Tension control is one of the outstanding features of the net. Once the net has been set in place and the slack reeled up, there is nothing which can stretch with a resultant lowering of the net. A canvas top permits natural action to a "net ball."



Auto Generator Drives Portable Electric Phonograph

A SIX-VOLT storage battery and an old auto generator are easily set up to drive the turntable of any portable phonograph, giving an electric installation suitable for public address installations or for outdoor sound recording in connection with home talkie movies. The generator speed is reduced by a worm and gear arrangement, and controlled by a heavy duty rheostat in series with the battery. A rheostat in the field circuit of the generator will also prove satisfactory for speed control. The turntable speed should be 78 r.p.m.—Phoebus Ch. Lessios.



An auto generator here serves as a direct current motor to drive the turntable of this portable electric phonograph.

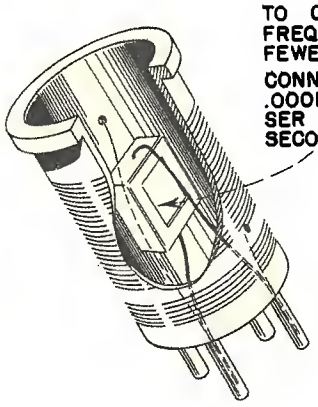
Mount Resistors in Grid Clips

Grid clips attached to tube socket terminals with stiff wire make quick-change resistor mountings.

THE slotted clips used to make contact with screen grid tube caps make excellent quick-change mountings for almost any type of resistor.—G. Rafuse.

Condenser Simplifies Coil Design

WHEN plug-in coil forms are not large enough to hold the turns necessary to pick up stations at the low frequency end of the broadcast band, connect a fixed condenser in parallel with the secondary winding of the coil. If the new midget size condensers are used, place inside the coils.—Eric Adams.



Small fixed condenser connected in parallel with secondary winding and tuning condenser of short wave set permits tuning of low frequency stations with fewer turns. Support condenser by stiff wire leads as shown in above sketch.

Send in Your Own

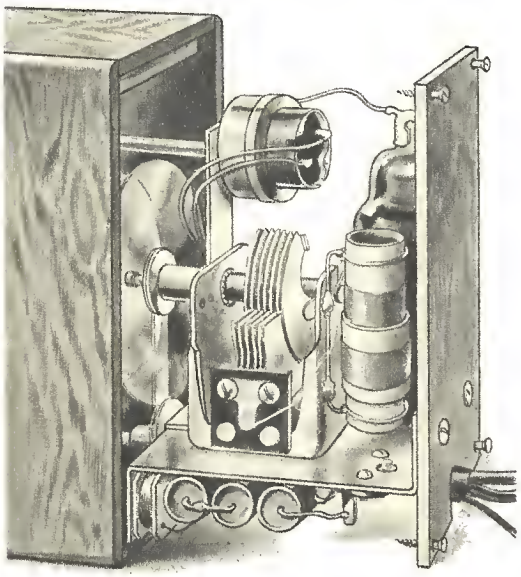
RADIO KINKS

See your own ideas in print; earn money for new equipment and radio parts. The Radio Editor will pay $3 for each accepted radio kink that has not been published elsewhere. Send accurate diagrams similar to those on this page, photographs if possible, and a short description of the idea. Include return postage if you wish your manuscript returned. Address the Radio Editor, Modern Mechanix Pub. Co., Minneapolis, Minn.

Radio problems are answered free of charge by the Radio Editor. Describe clearly the trouble encountered, making rough diagrams of circuits where necessary. Enclose a stamped, self-addressed envelope.

REMOTE CONTROL Unit

Change stations and volume from the arm of your favorite chair with this unique one-tube tuning box. Police calls can also be heard, even though your radio receiver will not pick them up now.



All parts of the remote control unit ere mounted on an eluminum or electrelloy chassis which is in turn bolted to the back of the vernished wood cabinet 3¼"x6½"x4¼" deep. The airplene type dial is mounted on e brecket on the chessis, coming out with it when the knobs on the front of the set are loosened and removed.

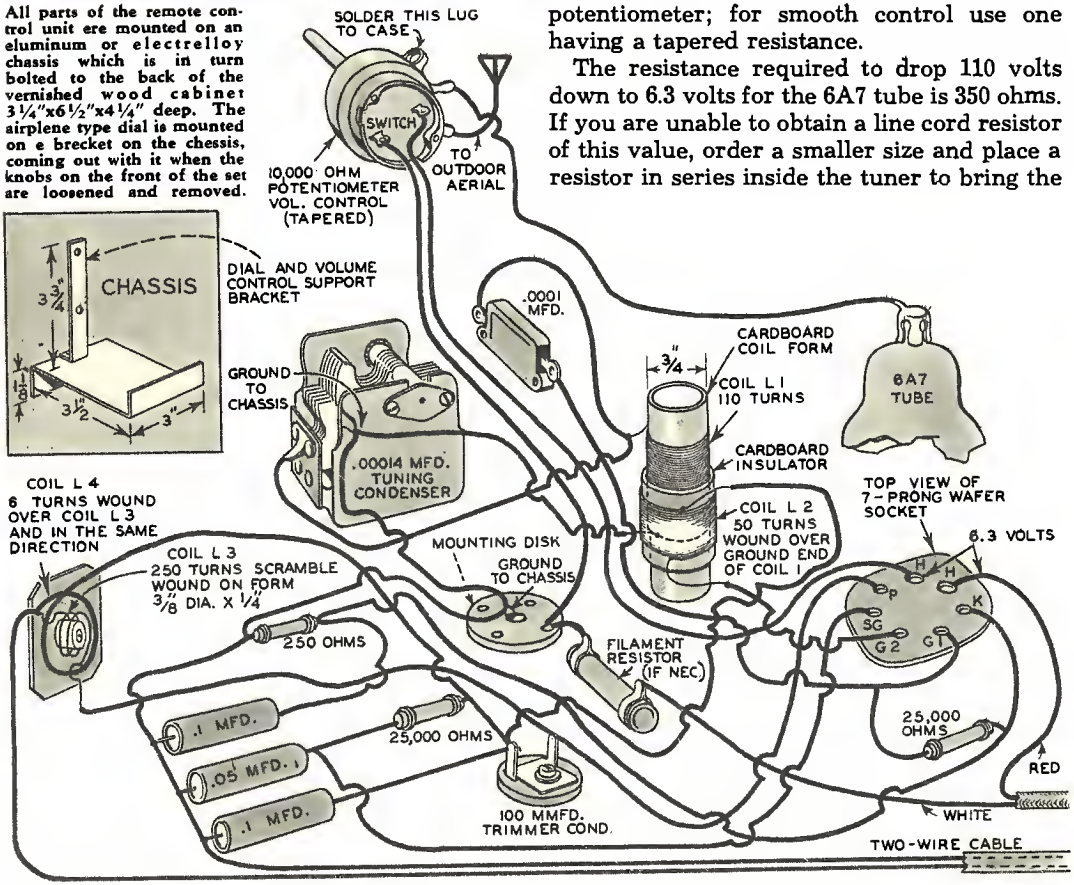
OPERATING as easily and accurately as the controls now on your radio receiver, this compact tuner utilizes the type 6A7 detector-oscillator tube in a unique new circuit.

Selectivity on this control will be just as good as on the set to which it is attached, as proper selection of circuit capacities makes possible the use of a single midget type tuning condenser without an antenna coil.

All of the coils can be made from No. 34 double silk covered wire. Study the sketches carefully before starting them, as the direction of each winding and the connections are very important.

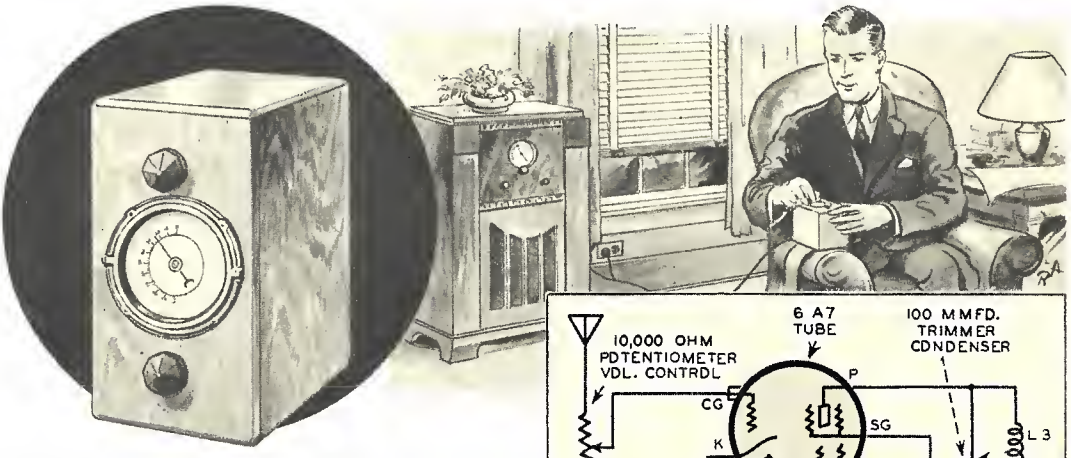
The volume control is a 10,000-ohm potentiometer; for smooth control use one having a tapered resistance.

The resistance required to drop 110 volts down to 6.3 volts for the 6A7 tube is 350 ohms. If you are unable to obtain a line cord resistor of this value, order a smaller size and place a resistor in series inside the tuner to bring the



TUNES Any RADIO

by JOHN T. BAILEY



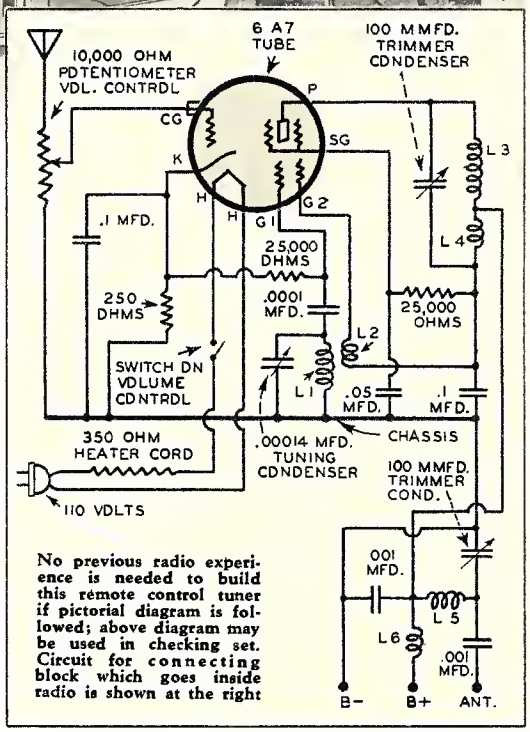
A weighted leather strap fastened to the bottom of the tuning box will hold it on the arm of a chair. The wires to the radio set may be of any desired length. Tune in stations with the lower knob; change volume with the upper.

total filament circuit resistance to the correct value. This resistor should have at least a 10-watt rating.

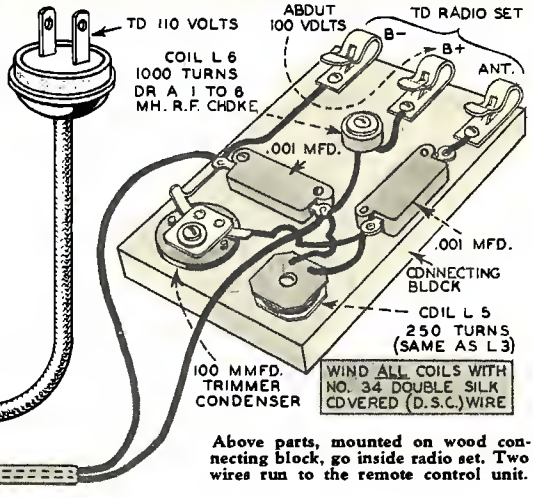
To operate, connect your outside aerial to the lead coming out of the control box, then connect antenna posts on your radio and the connecting block together. Connect the B plus terminal on this block to some point in the set having about 100 volts d.c., such as the screen grid terminal of a tube.

Connect B minus to the chassis of your radio, or in the case of an AC-DC set, to one side of the power line. Turn on the radio and turn the dial to 550 kc., at one end of the dial.

Plug the control box into a wall socket and turn on the switch on the volume control. When the tube is warm, tune to a station and adjust the two 100 mmfd. trimmer condensers for greatest volume. None of these adjustments are critical. The control should tune from 550 kc. to around 1,800 kc., bringing in some police calls.



No previous radio experience is needed to build this remote control tuner if pictorial diagram is followed; above diagram may be used in checking set. Circuit for connecting block which goes inside radio is shown at the right



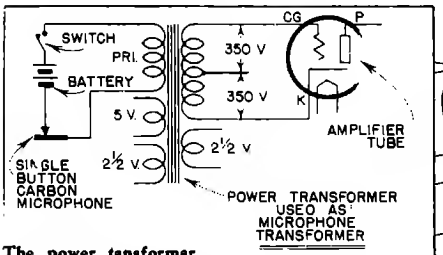
Above parts, mounted on wood connecting block, go inside radio set. Two wires run to the remote control unit.

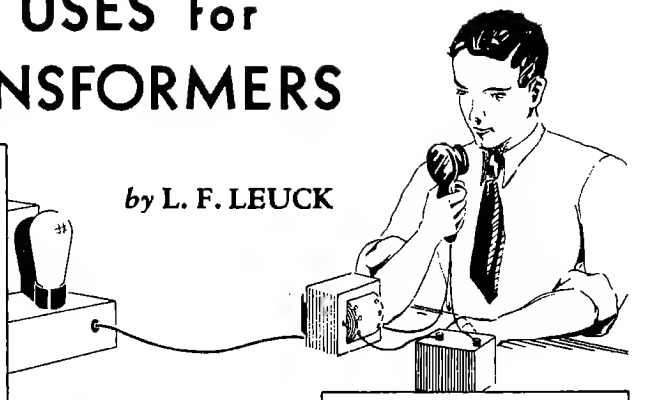
BUILD FROM BLUEPRINTS

It is always easier to build radio projects from MM blueprints, for all diagrams are enlarged many times and placed on tough white paper that will stand rough handling. Blueprints for this Remote Control Radio Tuner are 50c postpaid, and contain a complete, detailed list of the parts you will need. Address Modern Mechanix Publishing Co., Minneapolis, Minn.

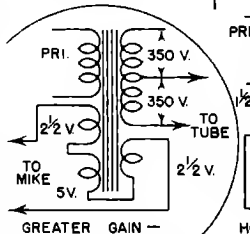
SEVEN NEW USES for POWER TRANSFORMERS

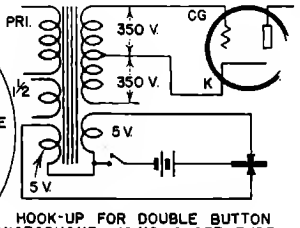
by L. F. LEUCK

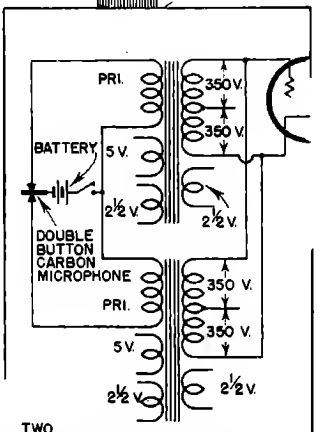




The power tansformar in an averaga siza radio ordinerily has a 350-0-350 volt secondary, a 115 volt primary, and 5, 2½, and 1¼-0-1¼ volt filament windings. Connact es in abova diagram to usa as a singla button microphona transformar. Quality will be satisfactory. For graatar gain connact as at right, with filamant windings in sarias (adding).



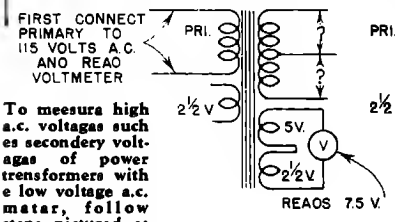


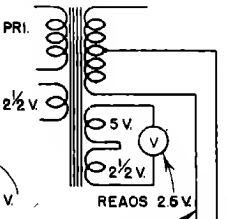


NOTE:
WHEN TWO OR MORE WINDINGS ARE CONNECTED TOGETHER, THE VOLTAGES WILL ADD OR SUBTRACT DEPENDING UPON THE CONNECTIONS. THE CORRECT CONNECTIONS MUST BE DETERMINED BY TRIAL.

To tell if windings add, connact transformar to a. c. lina, and chack with a. c. voltmatar.

Abova connections provida nacessary cantar tap for doubla button microphone transformer; usa one or both secondary windings. A bettar arrangamant, using two old power transformars with a doubla button mika, is at right. Highar impadanca hara gives better quality.

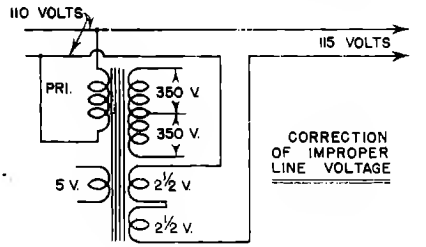




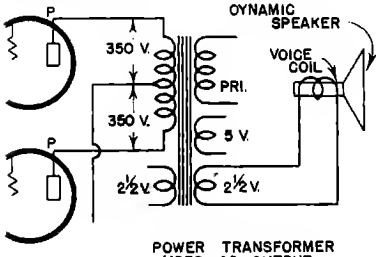
UNKNOWN VOLTAGE EQUALS

$\frac{7.5}{2.5} \times 115 = 345$ VOLTS

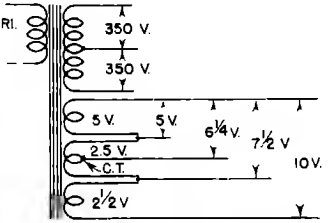
To meesura high a.c. voltagas such es secondery voltagas of power trensformers with e low voltage a.c. matar, follow staps picturad at right. Multiply ratio of metar raadings by a.c. lina voltage to obtain voltage of half of secondary of powar transformar.



Low or high lina voltagas may be corrected by a power trensformar connected es above. Filement windings should be in series adding and antire group connactad to add or subtract. Chack results with voltmatar. Load limit is 200 watts.



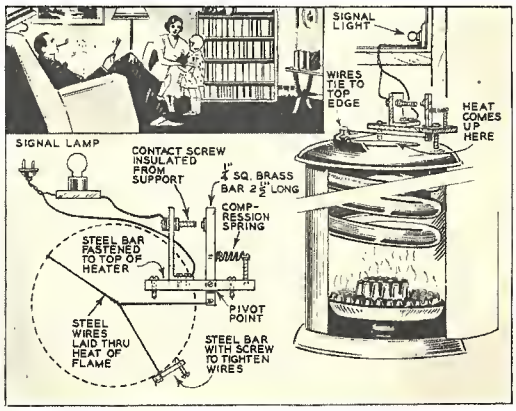
Used as en output transformer for e dynamic speakar, powar transformar connections ara as at the left. If voluma is too low, connect 5-volt winding to voica coil. As much as 10 volts may ba usad on voica coil if quality does not suffar. For ona tube output stages, simply omit ona of tubes shown in diagram. In this case try connecting antire high voltaga winding into plata circuit. At right is simpla method of obtaining diffarant filament voltages for axparimental work.

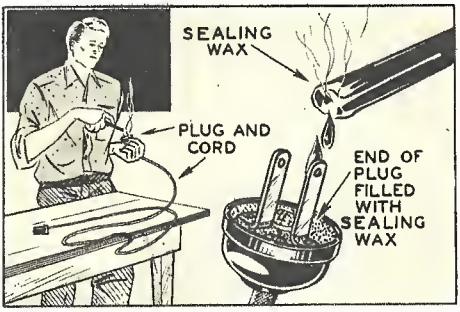


ELECTRIC KINKS

Signal Tells if Water Heater Is On

DEPENDING upon the stretching of a steel wire with heat, this automatic signal device is a gentle reminder that the water heater is operating. When the gas burner is operating properly, the flame will heat the steel wire, closing the contacts controlling the signal light mounted near the upstairs switch. Failure of the burner is indicated if the lamp does not glow shortly after the gas is turned on. The signal lamp may be a 6-volt auto tail light bulb operated by a bell transformer.—J. C. Kaytor.


SIGNAL LIGHT
WIRES TIE TO TOP EDGE
HEAT COMES UP HERE
SIGNAL LAMP
CONTACT SCREW INSULATED FROM SUPPORT
1" x 1/4" SQ. BRASS BAR 2 1/2" LONG
COMP-RESSION SPRING
STEEL BAR FASTENED TO TOP OF HEATER
PIVOT POINT
STEEL WIRES LAID THRU HEAT OF FLAME
STEEL BAR WITH SCREW TO TIGHTEN WIRES

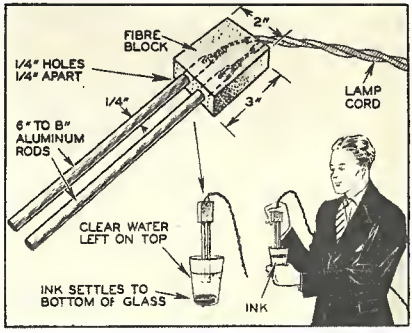


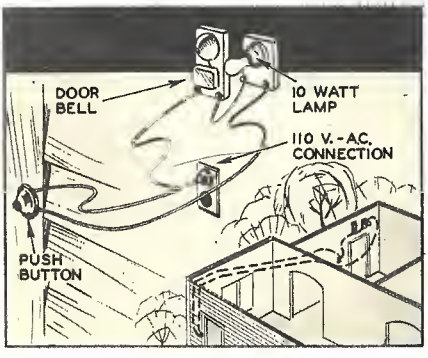
Sealing Wax Makes Electric Plugs Safe

SHORT circuits often result because of the common practice of pulling electric fixture plugs out of wall sockets by the cord. Strands of wire, loosened bit by bit, eventually short and blow the fuses. Tighten up the screws in the plug, then pour in melted sealing wax until all wires are covered. The wax will anchor the cord securely, and double the life of extension cords. The electrician will find other similar uses for sealing wax.—E. J. Novak.

Electric Water Softener Makes Ink Clear

ALUMINUM rods mounted in an insulating block and connected to an a.c. source will turn ink into water, soften hard water, and do a host of other fascinating electro-chemical experiments. Solids in the solutions magically settle to the bottom when the current is turned on. A gallon of water can be softened in less than five minutes with the unit dimensioned in the sketch at the right. The liquids must be placed in a glass or porcelain jar, to prevent electrodes from short-circuiting.—A. H. Waychoff.

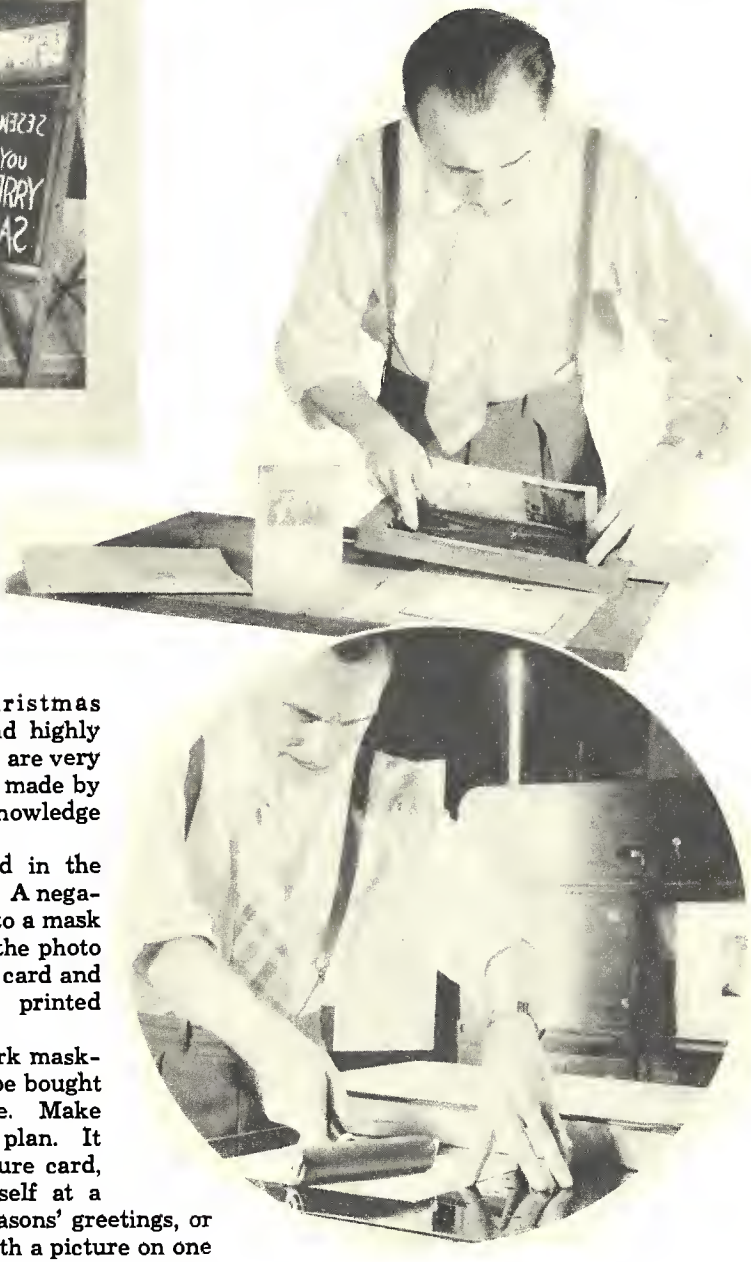




Operate Doorbell Without Transformer

AN ORDINARY 110-volt electric light bulb of almost any wattage may be used to replace a doorbell transformer. The circuit is shown at the left, the lamp being in series with the bell to reduce voltage to the correct value. Different size lamps change the volume. With this system. however, the entire bell circuit must be wired with approved No. 14 inside wiring instead of bell wire, to pass Fire Underwriter's requirements. The light glows when the bell rings, acting as a signal for deaf persons.—G. H. Skolfield.

Make Your Own



Simple cards can be made by writing message on bleckboard, as shown above, photographing entire scene end printing on greeting card stock. Prepare mat (right) by cutting openings in proper places and attaching negatives with photo tape. Circle—Use ferrotype tin and roller to produce glossy finish on postcard greetings.

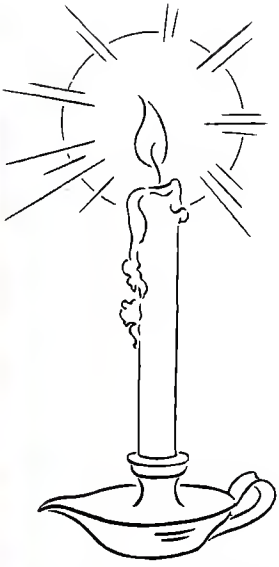
PHOTOGRAPHIC Christmas cards have novelty and highly personalized appeal. They are very inexpensive and are easily made by any one with elementary knowledge of photography.

Photo cards are printed in the same manner as snapshots. A negative is prepared and fixed to a mask with openings cut out for the photo you want to appear on the card and another opening for the printed portion of the message.

The mask is made of dark masking cardboard, which can be bought at any photo supply store. Make a layout of the card you plan. It may be a simple one picture card, such as a photo of yourself at a blackboard spelling out seasons' greetings, or it may be a folding card with a picture on one side, and the greeting on the opposite face. In the case of a printed greeting, a process film negative may be purchased at most supply stores which have typical holiday sentiments neatly printed out in reverse, which, when exposed will produce legible, black type. The cost of these process negatives is around 25c each. After making the layout, cut openings in the mask, and, working over an underlighted table, or against a window pane, line up both the photo and the printed greeting very squarely, using photo tape to secure the film to the mask.

The mask is then trimmed to the size of the printing frame, so that it will completely fill the frame. On two edges of the mask line up cardboard edges so that the photo paper

Photo Christmas Cards



Drawings above and at lower left can be photo-copied and used above or below printed message. Left — Copying drawing. Use process film. With two 500-watt lights expose 16 sec. at f:8.

will adjust itself squarely at each insertion. This cardboard liner will have to be about the same thickness as the paper used.

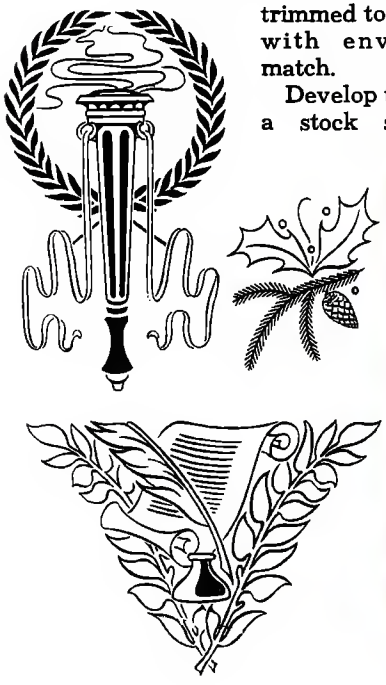
A double weight paper is usually used. Your photo supply store can recommend the beautiful, heavy buff stock commonly used for greeting cards and trimmed to correct size with envelopes to match.

Develop the prints in a stock solution of paper developer, using an acetic acid short-stop and normal hypo fix. See that the prints are washed thoroughly after fifteen or twenty minutes in the hypo.

Before actually printing the cards make sample exposure strips by the clock. When the proper number of seconds exposure has been determined, all cards should be exposed the same way. Print up a batch of cards, and then develop them all at once.

After all the prints are developed and fixed,

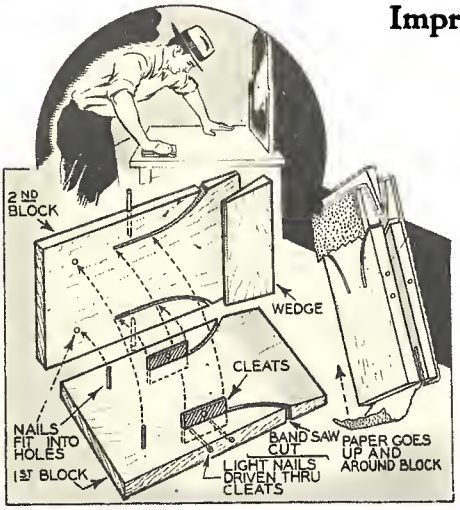
[*Continued on page* 126]



Two negatives are prepared for Christmas cards similar to this, one of the personal photograph and one of the message. Openings in masking cardboard are cut to fit negatives. Negatives of typical holiday greetings can be purchased.

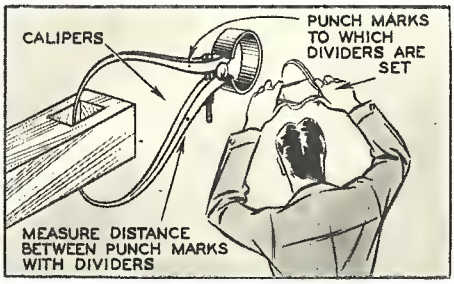
WOOD-WORKING TIPS

Improved Sanding Block Lasts Twice as Long



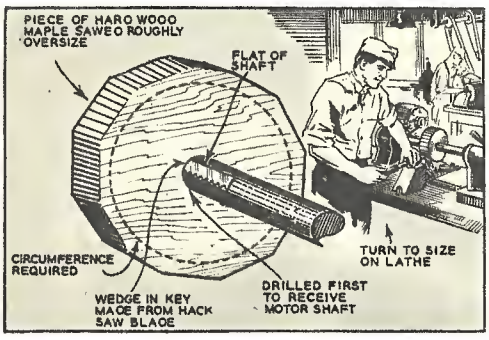
FURNITURE finishing work is lightened with this ingeniously designed sanding block, having two perfectly smooth working surfaces. New sheets of sandpaper can be set in place in a minute, simply by pulling out a single wedge. Construction of the block is given in the sketch at the left; a suggested size is 3½"x5½". Cut each block from 1" pine, making bandsaw cuts for the cleats or drilling a series of holes end to end for same purpose. The cleats hold the two blocks about one-sixteenth inch apart, allowing them to rock slightly. Any play after sandpaper is inserted is taken up by the wedge forced between the beveled ends. Two nails with heads removed, fitting into holes in the second block, insure exact alignment. A different grade of sandpaper may be placed on each side of the block.—J. R. Osborne.

Transfer All Dimensions with Calipers



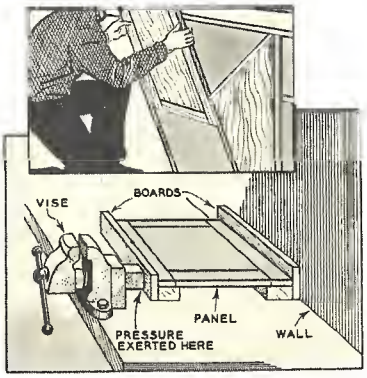
ORDINARY calipers of either the inside or outside type may be used for transferring dimensions on intricate objects if a prick punch mark is first made on each leg, and the caliper setting transferred to a pair of dividers. Upon removal of the calipers from the work, they are again set so that the divider points rest in the punch marks.—E. T. Gunderson, Jr.

Make Your Own Pulleys On a Lathe


PIECE OF HARD WOOD MAPLE SAWED ROUGHLY OVERSIZE
FLAT OF SHAFT
TURN TO SIZE ON LATHE
CIRCUMFERENCE REQUIRED
WEDGE IN KEY MADE FROM HACK SAW BLADE
DRILLED FIRST TO RECEIVE MOTOR SHAFT

WHEN pulleys are not available for any particular speed requirement, satisfactory pulleys of exactly the correct size can be turned from hard maple on a lathe. First drill a hole large enough for the shaft, then saw the stock roughly to size. Place the stock on a short shaft, keying it by driving a piece of hacksaw blade across the flat of the shaft, and complete the pulley on a lathe.—O. J. Hayes.

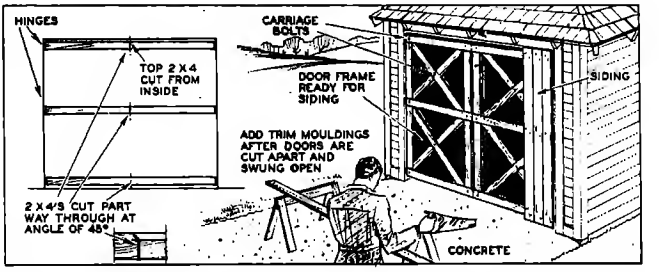
Workbench Vise May Be Used as Gluing Clamp



WHERE large gluing clamps are not at hand, the workbench vise makes a satisfactory substitute. If a cabinet door is being assembled, block it up on the workbench in such a way that the movement of the vise rod will provide the required pressure. If there is no wall or backboard which could withstand the thrust, insert pegs in the workbench top.—W. R. Miller.

Build Two Garage Doors at Once in a Frame, Then Saw Apart

BY BUILDING the garage doors as a single unit hinged into the frame before the siding is fastened, the doors can be hung and perfectly fitted by one man in a few hours. Hinge the three 2x4 pieces in the door frame first, cutting each partly through at the center to simplify separating. Construct frames next, then place on siding. The doors can now be sawed in two.


HINGES
TOP 2 X 4 CUT FROM INSIDE
2 X 4'S CUT PART WAY THROUGH AT ANGLE OF 45°
CARRIAGE BOLTS
DOOR FRAME READY FOR SIDING
SIDING
ADD TRIM MOULDINGS AFTER DOORS ARE CUT APART AND SWUNG OPEN
CONCRETE

Unless there is another entrence to the gerege, one person should stay inside while the siding is being neiled, to eid in sewing the douhle doors apart.

NEW MM BLUEPRINTS

TINY TOM—00 GAUGE LOCOMOTIVE. Complete instructions for building from metal with ordinary shop tools a pencil-length steam locomotive with tender. Scores of diagrems, ell ectual size or lerger, cover step-hy-step the forming of the parts, the essemhly, and the instellation of the electric driving motor. Full instructions included $3.00

00 GAUGE COACH. You'll want et least two of these midget coeches for your tehletop railroed system. Meny drewings are actual size. Price of plens 25c

MODEL RAILROAD EQUIPMENT. Instructions for huilding e turntehle, drawhridge, semaphore signels and e crossing gate ere all on this one blueprint 25c

QUEEN MARY MODEL. Build this beeutiful 16-inch long model of England's newest super-liner; e pocketknife is the only tool reelly needed. Plan end profile drewings are actual model size, so thet no drewings need he redrewn. 50c

RACING BOBSLED. Four-passenger sled with individuelly suspended "knee-action" runners; sled will trevel fester than 60 m.p.h. safely. 75c

MIDGET MILLER AUTO. This midget euto, e scele model of the famous Miller dirt track recer, is powered hy e smell ges engine teken from e lawn mower or weshing machine. New midget size wheels and belloon tires ere used. Novel clutch srrengement, reverse shift, brakes, and 20 m.p.h. speed are features. $3.00

COLLAPSIBLE CAMPING TRAILER. An easy-to-huild, low-cost treiler designed hy Sir Guy Standing, movie star. Overhenging hunks fold inwerd, end ceavas top lowers for treveling. Hardwood freme of 6'x14' hody is covered with pressed wood. Trailer is light yet sturdy, and uses any auto exle and spring. Building costs ere considerebly less than for e standerd solid-body treiler, yet there is more room. $2.00

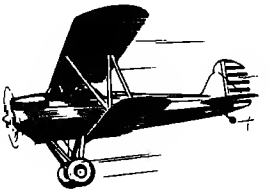
SUNRAY—15-FOOT SLOOP. A recing sloop in the *Sun* cless, designed hy thet femous neval erchitect, Sam Rebl. Fest, seeworthy, and easy to build, *Sunray* is the lest word in hostbuilding economy. Melnsail eree is 97 sq. ft.; jih eree is 23 sq. ft. Bill of meteriels is included. $3.00

ARC WELDING GENERATOR. Instructions for converting an old Dodge generetor into an 80-ampere erc welder hy rewinding some of the field coils end reconnecting. Instructions for reector end rod holder included. 50c

TOOLBOX PORTABLE RADIO. A three-tube hroedcest and short wave receiver with betteries, speaker, end set ell in the one hox; picks up long and short weve hroadcests. New 2-volt tubes ere used 50c

SEMI-LOG CABIN. An easy-to-huild 28'x20' vacetion cottage costing between $200 end $300. Wallboard pertitions separete interior into kitchen, living room, porch, end bedroom. Sixty 8-inch logs ere needed for frame.....$1.00

GAS-POWERED MODEL PLANE. A 6-foot wing spreed flying model of the Berliner Joyce pursuit plane. A 1/5 h.p. gas engine flies the ship for 15 minutes on one tenkful of gas. Wing sections are shown in ectual size. $2.00



RADIOPHONE DIVING HELMET. Explore lake bottoms or locete lost outboerds with this simple but sefe metel helmet, equipped for two-wey rediophone communication. Can be used sefely 30 feet under weter. 50c

PEP—CLASS "C" OUTBOARD RACER. A trim 10½' long hydroplene design by Sam Rahl, that will bring out the top speed of whetever outhoerd engine you use. Simplified drewings and instructions make this speedy hoet very easy to build. $2.00

NOMAD—ALL-PURPOSE BOAT. Sem Rehl designed this 12½ foot hull for use either as a recing sloop, an auxiliery cruiser with cehin, en outhoard-powered cebin cruiser, or e rowboat. Mizzen, jih, end mainsell used for euxiliery cruiser give e totel sale aree of 91 sq. ft.; recing rig has 70 sq. ft. meinseil and 15 sq. ft. jib. $3.00

COLONIAL FURNITURE.
Chest of Drewers for bedroom—1½'x3'x4' high 25c
Four-poster Bed 25c
Bedside Combinetion Teble and Lemp.....25c
Ledder-Beck Cheir with woven cane seet 25c
Coffee Tahle 25c
Bridge Lemp with edjustahle shede support.....25c

WATERWHEEL GENERATORS. Plens for e 10-foot diemeter overshot weterwheel with maximum cepecity of 12 h.p., e ½ h.p. undershot wheel for weter-pumping or hettery cherging purposes, and instructions for building an automatic voltage reguletor for eny generetor $1.00

PUBLIC ADDRESS AMPLIFIER. Powerful hut low-cost six-tube all-electric amplifier using midget dynemic speaker es mlcrophone 50c

MM blueprints, made on tough paper that will stand the roughest of handling in the workshop, contain complete working drawings, made actual size wherever possible to simplify your building work, and complete step-by-step building instructions. A bill of materials is included on many of the prints. Descriptions and illustrations of other blueprint projects are in the new 1936 MM Blueprint Catalog, sent free on request if a three cent stamp for postage is enclosed. Order plans from Blueprint Dept.,

Modern Mechanix Publishing Co.
MINNEAPOLIS, MINN.

Foursome FLEXIBLE FLIER—

THIS Foursome Flexible Flier is a four-man racing bobsled that can hit a speed of a mile a minute. At 60 miles an hour there is a tremendous air drag at the rear. To break this a streamline tail-piece has been designed.

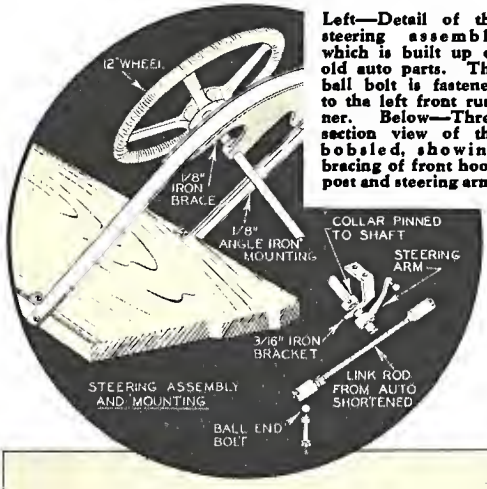
For safety the bobsled has a wide track of 22½" and individual pivoting of each runner, and for comfort, spring suspension of the chassis and footrests. For a few dollars at an auto wrecker's the essential parts can be purchased:—a 12" steering wheel and shaft, one steering arm, spring leaves, and brake rods.

The chassis board is a 1½"x14"x96" white pine plank cut to shape. The foot-boards, ¾"x4" pine, are supported by iron straps. If the auto steering arm is longer than 5" between centers, bend it to that dimension. The link rod pivots on a ball bolt on the left front runner.

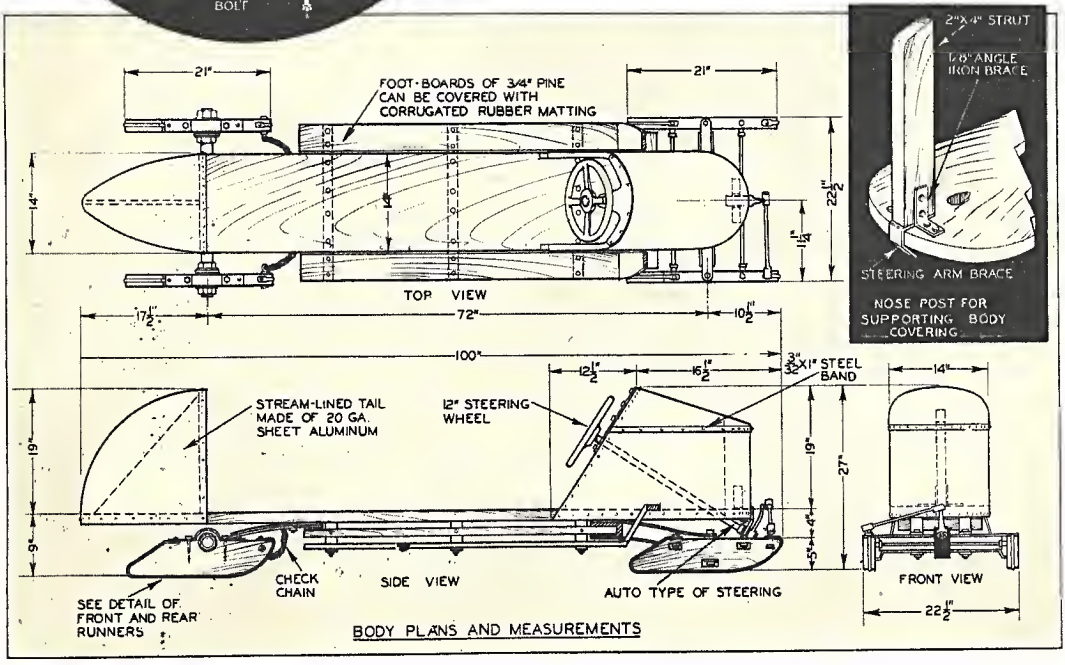
The runners are cut from ¾"x6" clear maple. The rear runners are mounted on a 25½" length of 2" iron pipe and each runner is free to oscillate independently as shown in the detailed drawing.

The contact surface of the runner is ⅜" drill rod set in a half-round groove. The surface on each side of the rod is faced with $\frac{3}{32}$"x½" cold rolled steel, fastened with countersunk flat-head wood screws. The oscillation of the rear runners is limited by a short length of chain between eyebolts in the nose of the runners and screw eyes in the chassis board. A rubber bumper, made of inner tube, is wound around the pipe axle to take up undue shocks.

The front runners are supported on a spring steel yoke built over a 2"x2½" maple core. The same bolts that hold the chassis board springs also hold the spring yokes to the core.



Left—Detail of the steering assembly which is built up of old auto parts. The ball bolt is fastened to the left front runner. Below—Three section view of the bobsled, showing bracing of front hood post and steering arm.



BODY PLANS AND MEASUREMENTS

a RACING BOBSLED

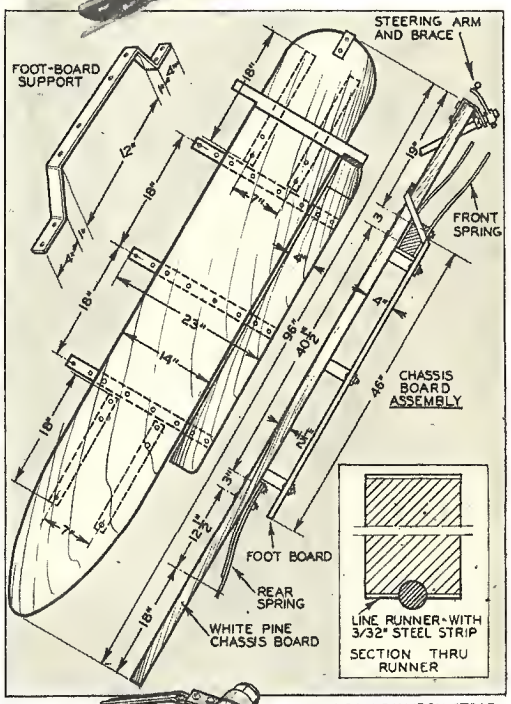
by DICK COLE

Note that the lower spring yoke is bent to fit the slot in the runner. Two tie rods, made of old brake rods and yokes, link the two runners together. A rubber bumper of inner tube is also wound around the front yoke.

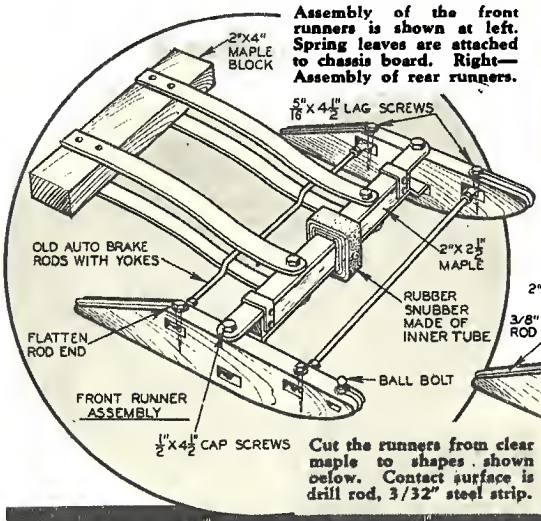
The finishing touches consist of making the front hood and the streamlined tail. This is simple sheet metal work clearly shown in the drawings.

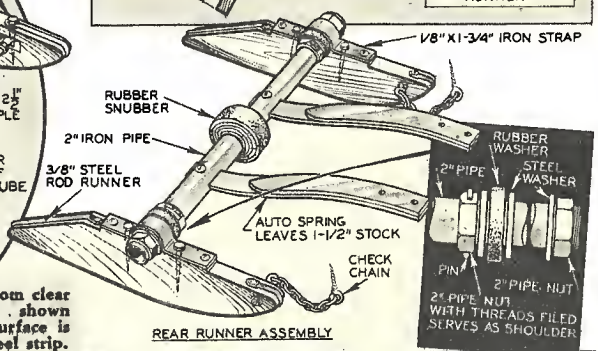
With the bobsled completed, give the entire job except the runners two coats of paint to protect it from dampness. As a suggestion, aluminum paint can be used to give it a striking appearance.

This bobsled is very fast. The driver puts his feet under the hood, while the passengers rest their feet on the foot board. If you are not familiar with the handling of bobsleds, it is suggested that you practise first on mild slopes. In spite of the wide track and other safety features, upsets are liable to occur if you are not experienced in handling a high speed sled. The sled will safely carry four passengers. A six-passenger sled can be had by merely extending the chassis board to a length of 9'6".



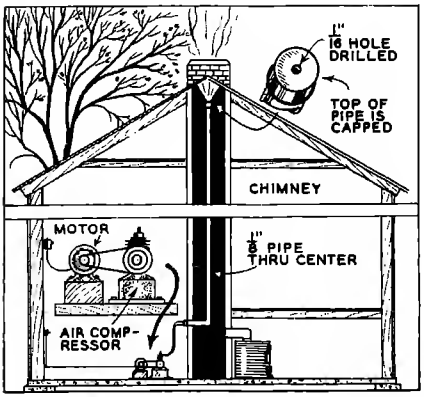
Assembly of the front runners is shown at left. Spring leaves are attached to chassis board. Right—Assembly of rear runners.





Cut the runners from clear maple to shapes shown below. Contact surface is drill rod, 3/32" steel strip.

SEASONAL HOME SUGGESTIONS

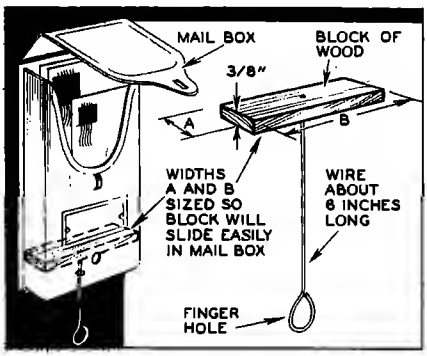


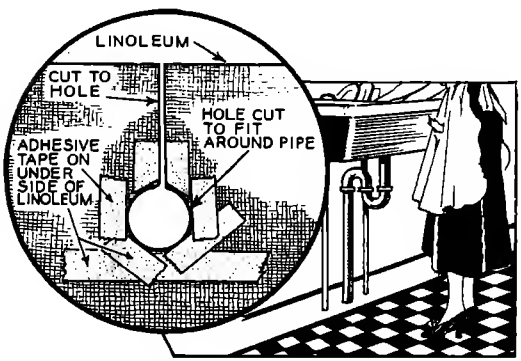
Improve Chimney Draft with Air Pipe

TO ELIMINATE the need for a new chimney when draft is inadequate for the newly-installed furnace or when trees blanket the house, try this draft-producing method. Run a ⅛" or larger air line up the center of the flue to within a few feet of the top, capping it and drilling a $\frac{1}{16}$" discharge hole. Connect this pipe in the basement to a small air compressor like those used for spray painting, or to any other source of compressed air such as an inflated auto tire. The air need be turned on only when starting a fire or when quick heat is desired in the house.—L. M. Eroehson, Winner—*MM HOME IMPROVEMENT CONTEST.*

Lifter Pushes Letters Out of Mailbox

TO PREVENT mail from clinging to the sides of the common city mailbox, where it may not be noticed for several days, build this simple lifting device. Drill a hole through the bottom of the box for the push rod, then cut a block of wood to a size that will slide easily up and down inside the box. Set this block in the bottom of the mailbox, then force a length of stiff wire into it through the previously-drilled hole. Bend the other end of the wire into a loop.—H. Moore.



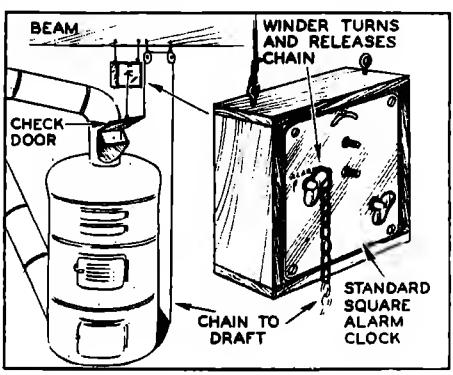


How to Fit Linoleum Around Pipes

ANYONE who has laid linoleum knows how difficult it is to obtain a snug fit around plumbing pipes without splitting or cracking the linoleum. Ordinary surgical adhesive tape is the solution to this problem. Carefully lay out and cut the required hole in the linoleum, then place strips of adhesive tape one inch wide on the under side.—J. E. Hogg.

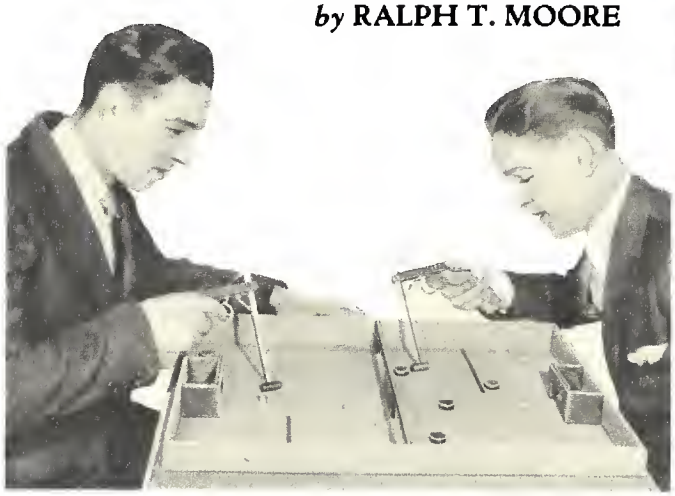
Automatic Furnace Control Costs $1.50

ALTHOUGH all parts of this automatic heat control should not cost more than $1.50, it will open the draft and close the check door of the furnace at any desired time each morning. The bell is removed from a cheap alarm clock, and a snug-fitting wood frame built. Hang the clock from a beam just above the furnace check door, then connect drafts together with chain. Key ring on short chain slips off alarm key to drop weighted check door in morning.—P. E. Clissold.



"Parlor Polo" Is the Latest Table Game

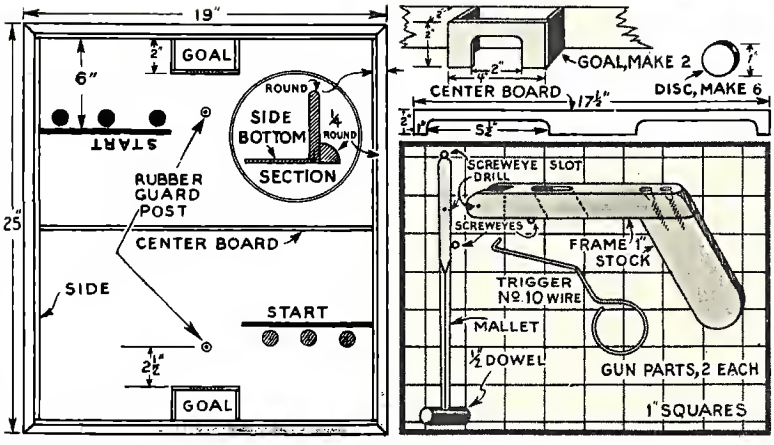
by RALPH T. MOORE



The "parlor polo" game board is just the right size for a card table. Player must drive his three colored discs into opponent's goal with "gun" mallet to win. Player must not hit opponent's discs with own mallet.

Nail 2"x⅜" sides and ends around 18"x24" plywood playing field, then place quarter-round moulding around outside at bottom. Cut two goal cages and the centerboard from ⅜" stock. Screw guard pieces cut from old rubber erasers 2½" in front of each goal. Paint START lines on board in black. Saw six discs from 1" broom handle wood, or use checkers; paint three black, the other three red.

Photos at upper right show construction of mallet gun and fastening of guard post in front of goal. Use any small spring for trigger of the gun.



THRILLS of polo combined with the fascination of a trigger-gun mallet make this newest of table games a sure cure for dull indoor hours during the winter months.

Each player is given three discs or "balls," to be lined up behind his own starting line. With the "gun" mallet he must drive his colored discs into his opponent's goal, yet at the same time guard his own goal. Only one shot is permitted at a time, making it necessary for a player to choose between an offensive and a defensive shot. Missing the disc with the mallet counts as a shot. The player first getting his three discs into the opposite goal is winner.

Make the "guns" first, cutting out the handles and frame pieces from 1" pine stock. Notch the barrel piece at the end for the mallet, then drill a slot diagonally through the barrel (see diagram) for the trigger.

The mallet handle is of ⅜" diameter stock, turned to shape on a lathe, and fitted into a 1" length of half-inch dowel.

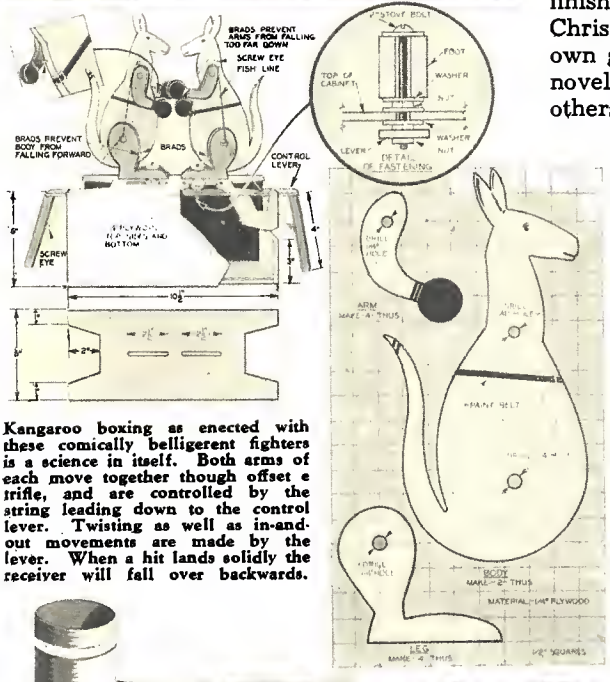
Fasten the barrel to the gun handle with screws, then hinge the mallet in the barrel notch with a finishing nail. Hook a small spring between screweyes on the mallet handle and on the barrel, to provide necessary tension. Now bend a piece of heavy steel or iron wire to the shape of the trigger, slip it through the barrel slot, and hook the wire into the screweye at the end of the mallet handle. A quick pull on the trigger is used for forward shots. For backhand shots, when the disc is near a corner, pull the trigger, then release it quickly.

Christmas SHOP Projects

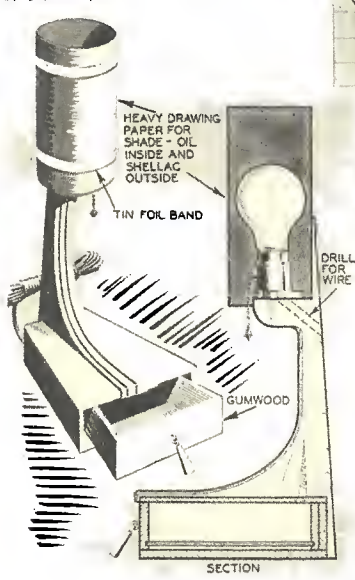
Solve that Xmas gift problem for yourself and for others with personalized presents, made in your own workshop. Children will welcome the boxing kangaroos or the exploding battleship; for grown-ups make the adjustable bridge lamp, the candy boxes, a table lamp, or a desk set.

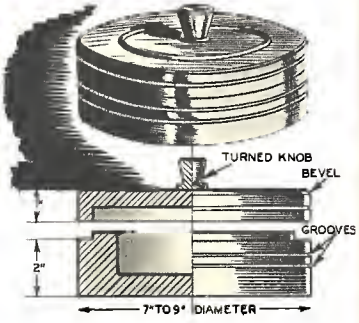
PROJECTS made in your own workshop, if attractively designed and carefully finished, are always welcomed by friends as Christmas gifts. After taking care of your own gift requirements, turn out a few extra novelties or pieces of furniture for sale to others or to gift stores. With no overhead expenses, you can set prices at a reasonable figure yet make a good profit for yourself.

Real fighters are the boxing kangaroos—ready to trade blows at the pull of a string. Transfer the patterns to ¼″ plywood after first drawing ½″ squares. Drill all holes and then cut out the pieces. Enamel each part separately in gay colors, and when dry paint in the belts, eyes, and other marks as suggested in the illustrations. Arms and legs are fastened to the bodies with 1″ long dowels, washers separating these parts from the bodies to give a free motion.

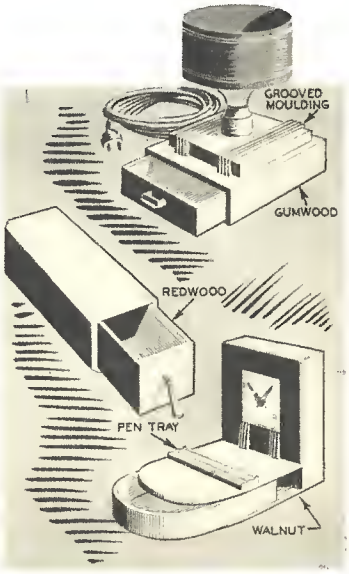


Kangaroo boxing as enected with these comically belligerent fighters is a science in itself. Both arms of each move together though offset e trifle, and are controlled by the string leading down to the control lever. Twisting as well as in-and-out movements are made by the lever. When a hit lands solidly the receiver will fall over backwards.





Cellophane-wrapped homemade candy placed in an attractively turned box, a simple redwood drawer-box, or one of the combination box-lamps, solves the Christmas gift problem. Designs pictured here are simply suggestions, and may be built in any size to suit materials at hand. Stain and wax or lacquer the outside of each project.



for GIFTS or PROFIT

Personal gift boxes made from walnut, gumwood, or redwood require only odd scraps of wood, yet bring a good price at the better Christmas gift shops. Lamps and clocks combined with the boxes give strikingly modern effects.

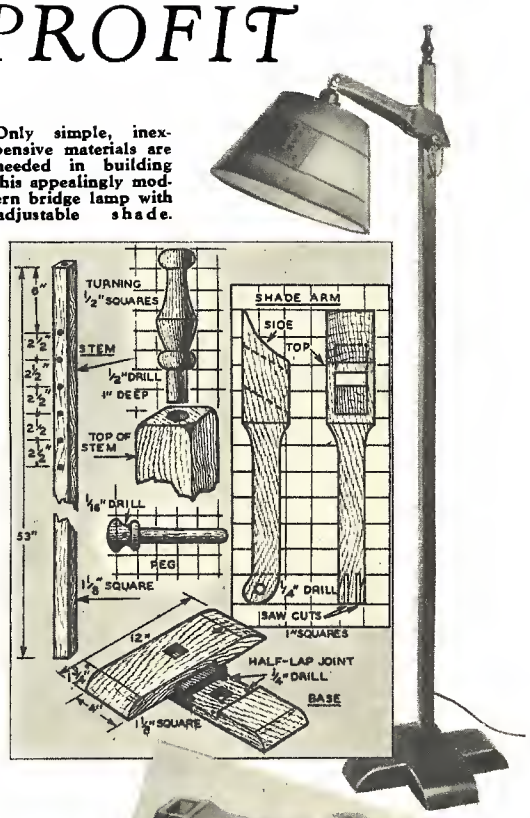
Where larger gifts are required, choose the adjustable bridge lamp. Maple, oak, or cherry woods are ideal, and can be finished with a minimum of work. The shade arm slips over the upright, and is held at the desired height by a wood peg passing through both arm and upright.

Instead of passing up through the center of the upright, complicating construction, the cord runs directly to the bracket type socket on the shade arm. A simple parchment shade about 12″ in diameter makes the lamp ready for use, after stain and lacquer have been applied. The construction of acceptable desk sets is by no means too difficult a task for the workshop enthusiast.

Remove the pen tip and rubber sack from

$5 FOR SHOP PROFIT IDEAS

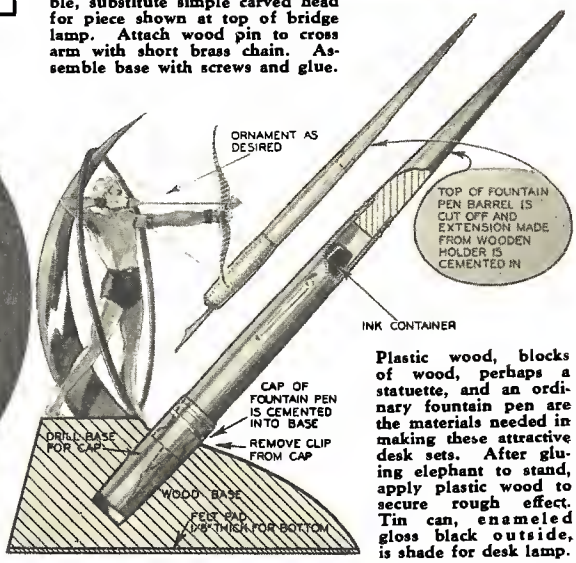
If you have made money with your workshop, tell us about it. Briefly describe the projects made, your cost for each, the profit made, and sales methods used, keeping your letter under 300 words, and send it in to the Workshop Editor, Modern Mechanix Publishing Co., Minneapolis, Minn. Five dollars will be given for each letter accepted for publication. Send diagram and photos if possible.



Only simple, inexpensive materials are needed in building this appealingly modern bridge lamp with adjustable shade.

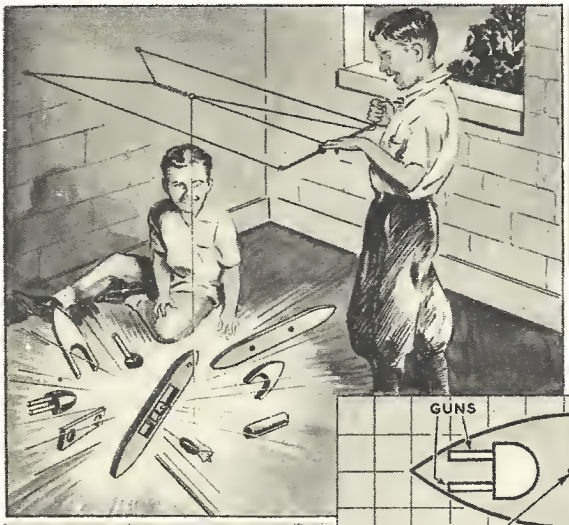
If wood-turning lathe is not available, substitute simple carved head for piece shown at top of bridge lamp. Attach wood pin to cross arm with short brass chain. Assemble base with screws and glue.

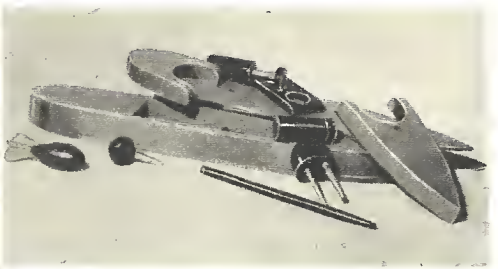
Statuettes mounted on plaster or wood base improve appearance of these home-made desk sets.


ORNAMENT AS DESIRED
TOP OF FOUNTAIN PEN BARREL IS CUT OFF AND EXTENSION MADE FROM WOODEN HOLDER IS CEMENTED IN
INK CONTAINER
CAP OF FOUNTAIN PEN IS CEMENTED INTO BASE
DRILL BASE FOR CAP
REMOVE CLIP FROM CAP
WOOD BASE
FELT PAD 1/8" THICK FOR BOTTOM

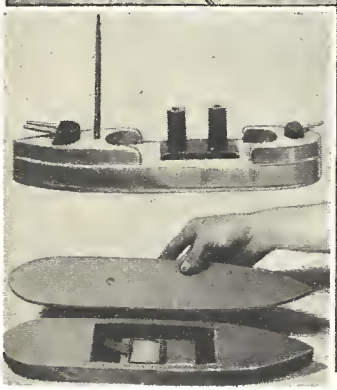
Plastic wood, blocks of wood, perhaps a statuette, and an ordinary fountain pen are the materials needed in making these attractive desk sets. After gluing elephant to stand, apply plastic wood to secure rough effect. Tin can, enameled gloss black outside, is shade for desk lamp.

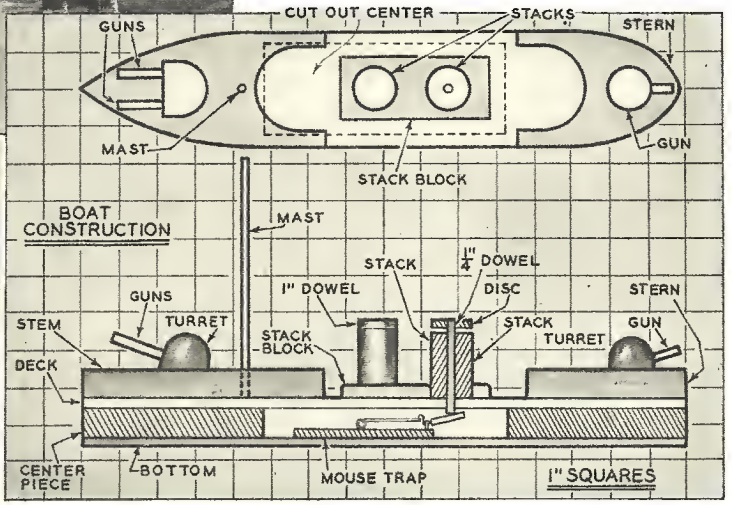
EXPLODING BATTLESHIP IS PROFITABLE TOY





Dropping the aerial bomb on the rear smokestack of this model battleship creates the havoc pictured above. A mousetrap concealed in the hold flings out the loosely assembled parts just as if the bomb itself had exploded.





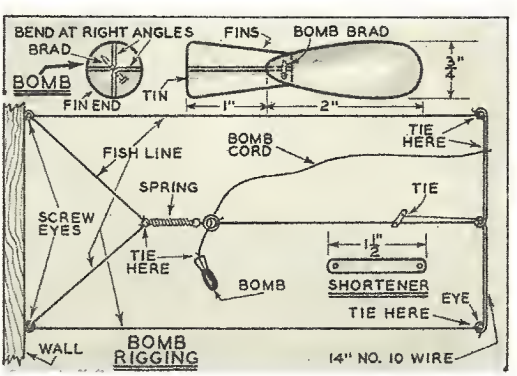
Dimensions for any part of battleship can be obtained by referring to the one-inch squares in background. Pieces fit loosely one atop the other. Remove bait lever and wire trigger from mousetrap, remounting at end of trap as shown above, to hold spring directly. Enamel pieces in gay colors.

the barrel of an ordinary fountain pen, then slice off the closed end of the barrel with a sharp knife.

Trim down an ordinary wood pen holder until it will fit snugly into the barrel, with diameters of both pieces the same at the joint. Glue the extension in place with a thick celluloid cement made by dissolving scraps of celluloid in a mixture of equal parts of acetone and alcohol. Now spray the entire pen with enamel.

The pen cap is cemented into a hole drilled into the type of base selected. The base may be a simple triangle block of wood, a statuette, or a combination lamp and desk set.

Drop an aerial bomb down upon the model battleship, and if your aim is good—WHAM—the ship explodes, scattering wreckage all over the floor. The pieces can be reassambled in a minute after resetting the mousetrap.



Nail two pieces of ¼" plywood 16"x3" and a 1" thick piece the same size together temporarily, then cut out to boet plan pattern on bandsaw. Cut stem and stern pieces next from ¾" stock. Cut out center of 1" thick piece to dotted lines, then glue bottom plywood to this and set in mousetrap. Rigging in above diagram makes aiming of bomb more accurete. Bomb string is long enough to reach floor.

Mount Photo On Plywood Backing To Make Lamp Stand

YOUR favorite photograph, enlarged and mounted on quarter-inch plywood, then outlined with a high speed jigsaw, forms the personalized stand for this attractive radio or end table lamp. A tree background may be cut out and mounted in the same manner.

The enlargement can be from 8 to 14 inches high, and should be colored after it is mounted. The photo is then screwed to a simple base, and all exposed wood parts are stained and varnished. Use any small shade having a wire holder which slips over a lamp bulb.

Finished photo statuette radio lamp, at right above, is simply the base and rough wood stand at left, concealed by photo enlargement mounted on plywood, cut out, and then colored.

Convert Room Heater Into Furnace

Convert circulating heater into hot air furnace to heat small homes. Insulate hot air pipes and furnace top with asbestos.

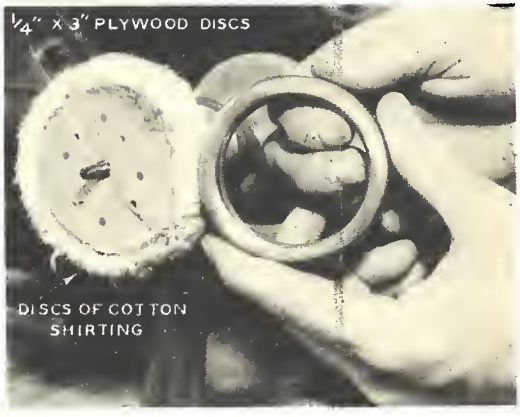
THE cabinet type of circulating heater, now used extensively for heating two or three rooms in small homes, may at little expense be converted into a hot air furnace for the basement. With individual pipes running from the basement to each of the rooms being heated, circulation of warm air is more uniform, and there is no need to carry coal upstairs.

Remove the top of the heater, after moving it into the basement, and bolt a sheet iron box at least 14" high in its place. Cut holes in this box for the hot air pipes.

Use Cloth Scraps for Buffing

SCRAPS of cloth ordinarily thrown away can very easily be mounted between wood discs and used for buffing purposes. Almost any size and thickness of wheel may be made, remembering that the cloth discs should be cut about 1½" larger in diameter than the two wood discs. Cut enough discs to give the desired thickness, then assemble between wood discs having holes drilled in the exact center to take the shaft of the buffing stand.

Since the cloth discs will have to be replaced occasionally, it is advisable to bolt the parts of the wheel together rather than use clinched nails.

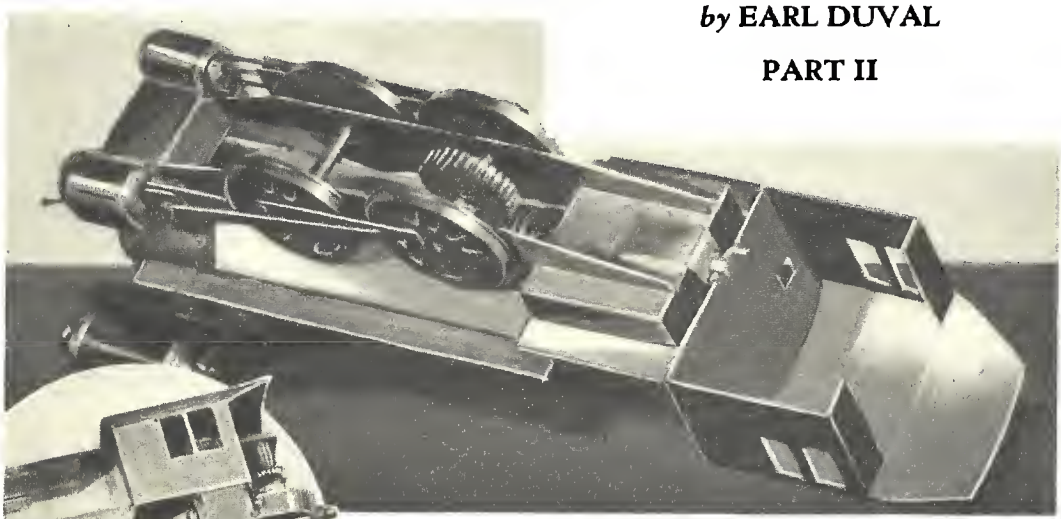


Homemade buffing wheels like that above, driven at high speed, are ideal for polishing small wood or plated metal parts.

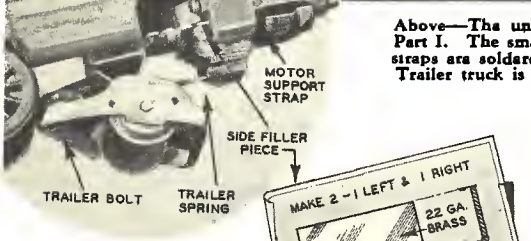
Making "Tiny Tom" a Real

by EARL DUVAL

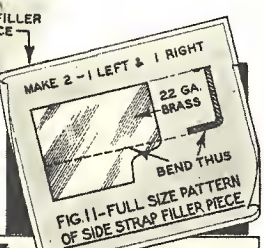
PART II

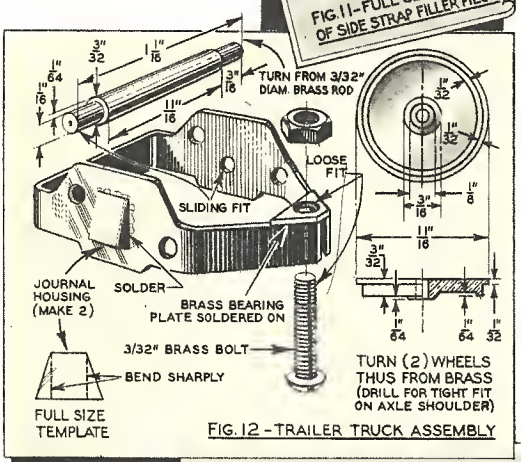


Above—The underside of "Tiny Tom" with construction as far as carried in Part I. The small electric motor is installed in the cab es shown et left. Brass straps are soldered to bottom of the field magnet on each side and to the cab. Trailer truck is hung loosely on bolt and part of weight is carried by spring.



Assembly of trailer truck is shown below. Drewings of truck wheels are full size.



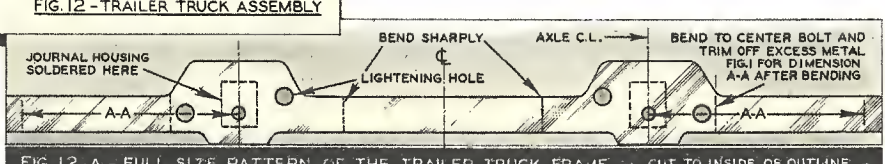

TURN FROM 3/32" DIAM. BRASS ROD
LOOSE FIT
SLIDING FIT
JOURNAL HOUSING (MAKE 2)
SOLDER
BRASS BEARING PLATE SOLDERED ON
3/32" BRASS BOLT
BEND SHARPLY
FULL SIZE TEMPLATE
TURN (2) WHEELS THUS FROM BRASS (DRILL FOR TIGHT FIT ON AXLE SHOULDER)
FIG. 12 - TRAILER TRUCK ASSEMBLY

IN THE first part of this series of articles the construction of "Tiny Tom," an 00 gauge version of a Southern Pacific railroad locomotive, covered the initial stages of the model. Building of the boiler, cab, frame, drive wheels, and cylinders was described.

This model locomotive, which costs less than five dollars to build, will be completed in this issue and next month construction of the tender will be described in detail.

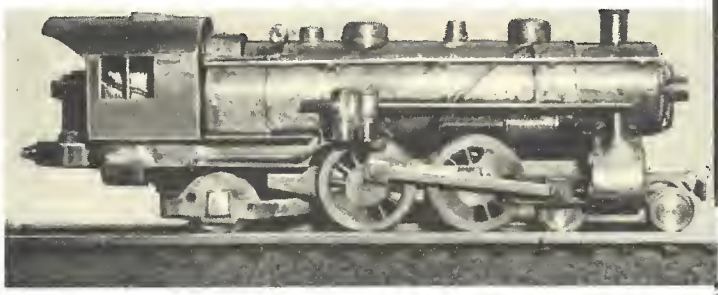
Once the drive wheels and drive and connecting rods are on the model it is necessary to quarter the wheels before fixing them permanently. This is done by setting the crank pins on one side of the model on a straight line through the axles and at right angles to the track as shown in Fig. 1. On the opposite side give the wheels a quarter turn toward the cab so that a line through the crank pins and the axles is parallel to the track. Quartering is necessary to assure smooth running.

"Tiny Tom" gets its power from a small electric motor made especially for 00 gauge


JOURNAL HOUSING SOLDERED HERE
BEND SHARPLY
LIGHTENING HOLE
AXLE C.L.
BEND TO CENTER BOLT AND TRIM OFF EXCESS METAL FIG. 1 FOR DIMENSION A-A AFTER BENDING
A-A
A-A
FIG. 12-A - FULL SIZE PATTERN OF THE TRAILER-TRUCK FRAME - CUT TO INSIDE OF OUTLINE -

Trace this truck frame template on 22 gauge brass. Cut and bend frame to shape shown in drawing at upper left. Insert axle and wheels before soldering brass bearing plate to the frame. Do not drill the axle holes until frame is bent to shape.

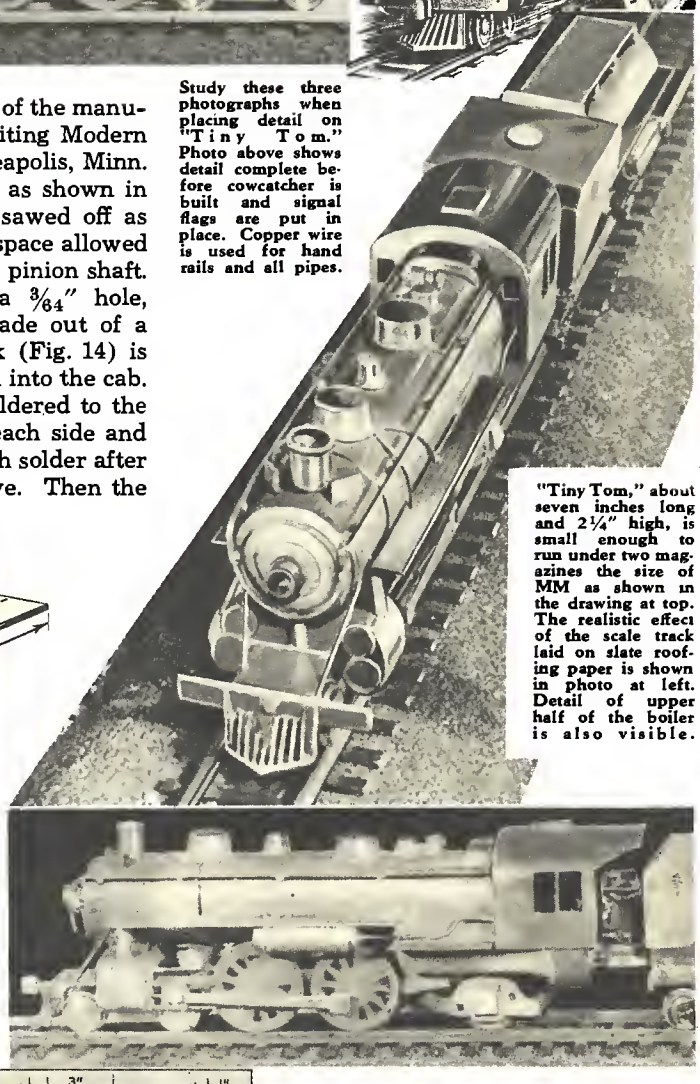
LOCOMOTIVE



Study these three photographs when placing detail on "Tiny Tom." Photo above shows detail complete before cowcatcher is built and signal flags are put in place. Copper wire is used for hand rails and all pipes.

locomotives. Name and address of the manufacturer can be obtained by writing Modern Mechanix Publishing Co., Minneapolis, Minn. The motor is placed in the cab as shown in Fig. 9 of Part I. The shaft is sawed off as short as required and about $\frac{1}{32}$" space allowed between the motor shaft and the pinion shaft. Both shafts are drilled with a $\frac{3}{64}$" hole, through which a chain link, made out of a paper clip, is inserted. The link (Fig. 14) is put in after the motor is soldered into the cab.

Two small brass straps are soldered to the bottom of the field magnet on each side and the straps sweated to the cab with solder after the shaft is lined up with the eye. Then the



"Tiny Tom," about seven inches long and 2¼" high, is small enough to run under two magazines the size of MM as shown in the drawing at top. The realistic effect of the scale track laid on slate roofing paper is shown in photo at left. Detail of upper half of the boiler is also visible.

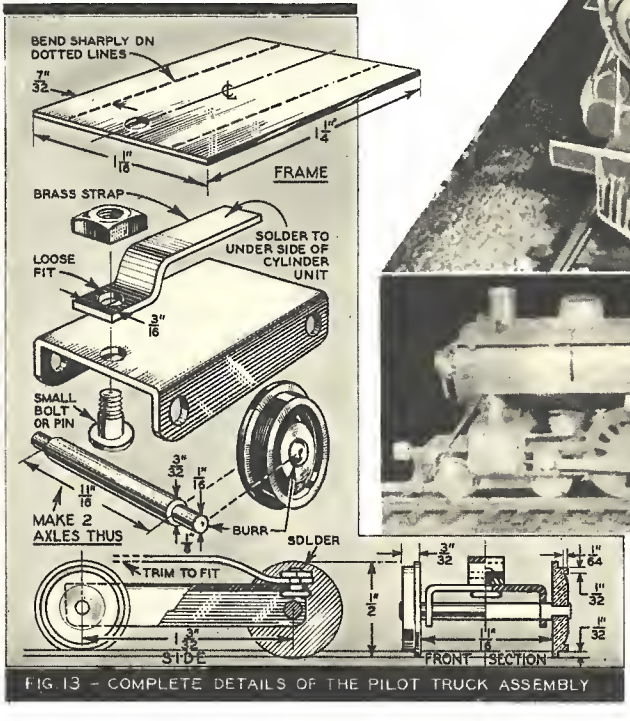
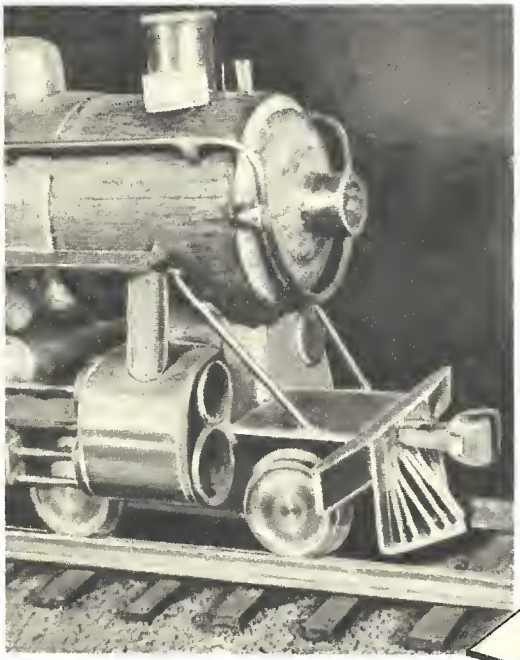


FIG. 13 - COMPLETE DETAILS OF THE PILOT TRUCK ASSEMBLY

Construction of pilot truck is shown in Fig. 13. Front and side views are full size. Cut frame from piece of 22-gauge brass and bend as shown. Axle holes are drilled after bending by placing block of wood between frame sides. Locomotive frame must be cut away to give pilot truck clearance as shown in Fig. 9, which also shows location of the brass strap

Enlarged Photo Shows Front Detail of "Tiny Tom"



About a third larger than the actual model, this enlarged photo shows detail of front end of the Tiny Tom locomotive.

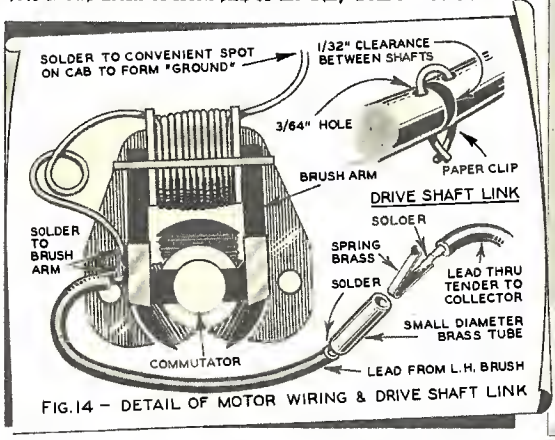


FIG. 14 – DETAIL OF MOTOR WIRING & DRIVE SHAFT LINK

Collector on tender picks up current from third rail for motor shown in Fig. 14. Full size patterns in Fig. 15 simplify cowcatcher construction. Pins are used for spokes.

link is inserted and the side strap filler piece (Fig. 11) soldered in place.

Wiring detail of the motor is shown in Fig. 14. This railroad employs a third rail to carry current. A collector on the tender runs on this rail and carries the current through the wiring to the motor to the ground in the cab and eventually to one of the running rails.

It is a good plan to run the motor in to see that no parts bind and that the small amount of current (4-6 volts, 8-10 amps) will move the drive wheels easily. Chuck the stub end of the motor shaft in a lathe. Turn by hand at first, using light sewing machine oil on moving parts. If nothing binds, spin the motor by lathe power until it is broken in. A breast drill can be substituted for the lathe if the model is held in a vise.

The motor in the cab makes the rear end of the locomotive heavy so that some of this weight must be carried by the trailing truck. The $\frac{1}{32}$" piano wire spring (Fig. 9) that is soldered under the firebox is bent down until it touches the frame of the trailing truck. Then it is looped up slightly to form a hook for the coupling on the tender.

The frame of the trailing truck is made of 22-gauge soft brass, laid out according to the template in Fig 12-A and bent to shape with pliers. The lightening holes, but not the axle

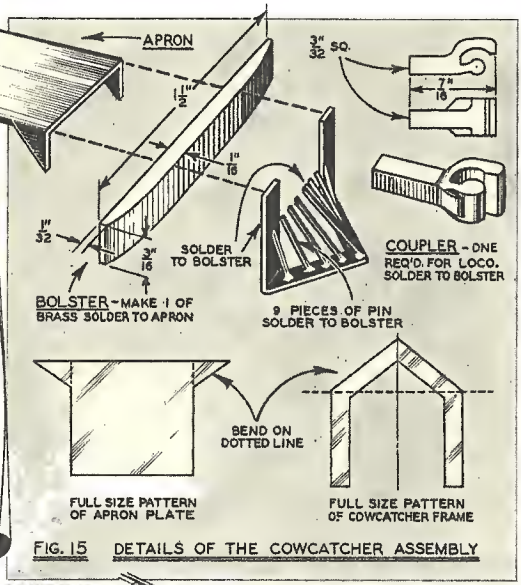


FIG. 15 DETAILS OF THE COWCATCHER ASSEMBLY

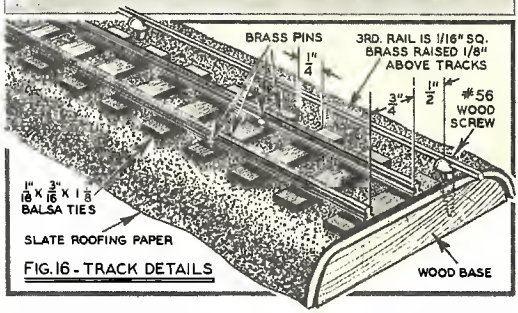
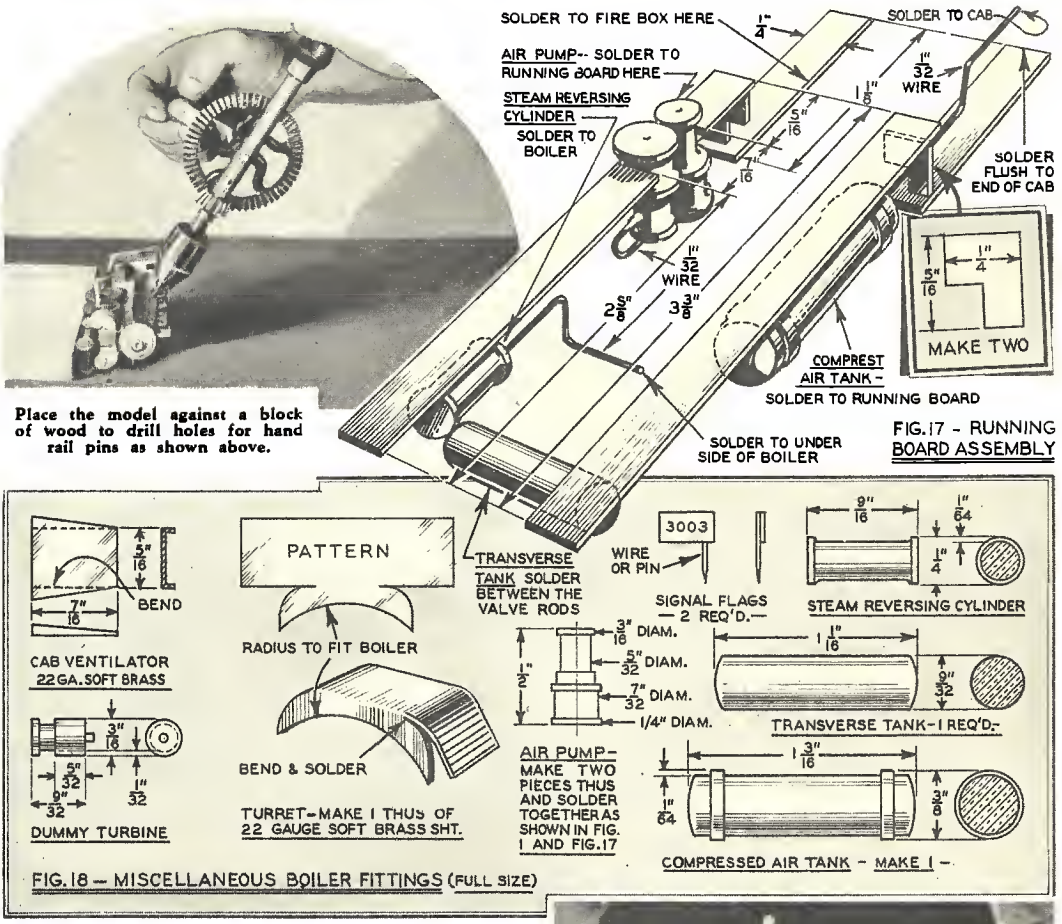


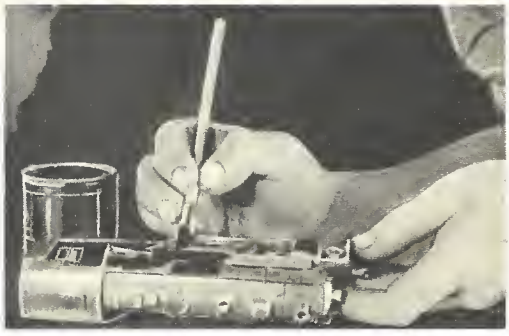
FIG. 16 - TRACK DETAILS

Scale track is used with this 00 gauge locomotive. The grade effect is obtained with curved wood base and roofing paper. Third rail can be standard type or radio bus bar wiring.

Boiler Fittings Shown in Full Size Drawings


SOLDER TO FIRE BOX HERE
AIR PUMP-- SOLDER TO RUNNING BOARD HERE
STEAM REVERSING CYLINDER
SOLDER TO BOILER
SOLDER TO CAB
1/32" WIRE
SOLDER FLUSH TO END OF CAB
MAKE TWO
COMPREST AIR TANK - SOLDER TO RUNNING BOARD
SOLDER TO UNDER SIDE OF BOILER
Place the model against a block of wood to drill holes for hand rail pins as shown above.
FIG. 17 - RUNNING BOARD ASSEMBLY
BEND
CAB VENTILATOR 22GA. SOFT BRASS
PATTERN
RADIUS TO FIT BOILER
BEND & SOLDER
TURRET - MAKE 1 THUS OF 22 GAUGE SOFT BRASS SHT.
DUMMY TURBINE
TRANSVERSE TANK SOLDER BETWEEN THE VALVE RODS
WIRE OR PIN
3003
SIGNAL FLAGS — 2 REQ'D.—
STEAM REVERSING CYLINDER
3/16" DIAM.
5/32" DIAM.
7/32" DIAM.
1/4" DIAM.
TRANSVERSE TANK - 1 REQ'D.
AIR PUMP - MAKE TWO PIECES THUS AND SOLDER TOGETHER AS SHOWN IN FIG. 1 AND FIG. 17
COMPRESSED AIR TANK - MAKE 1 -
FIG. 18 — MISCELLANEOUS BOILER FITTINGS (FULL SIZE)

Turn fittings for the boiler from brass rod to size shown above. Running boards are 22-gauge brass soldered to boiler and firebox. Right—Painting model with flat black paint.

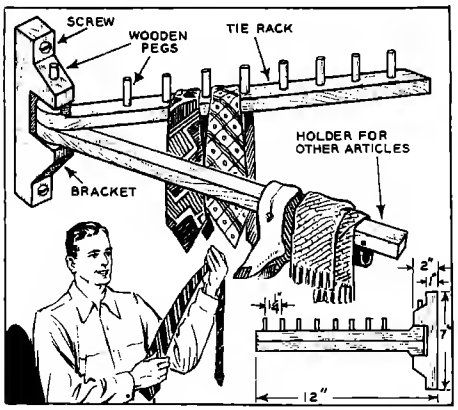


holes, should be drilled before bending. After the frame is soldered place a piece of wood between the sides and drill the axle hole squarely through both sides. The wheels and axle are turned from brass to the dimensions shown in Fig. 12 and the journal housing cut out and soldered in place. Drill and tap a hole for the trailing truck bolt in the bottom of the firebox and fasten the truck to the locomotive. Adjust the trailer spring so that the weight is thrown on the rear driving wheels.

With the motor and trailing truck in place "Tiny Tom" is ready for a tryout on a length of test track. Track for an 00 gauge model railroad is built as shown in Fig. 16. The track is built on a wood base ¾" high and 3½" wide rounded to represent a railroad track grade. Grey slate roofing paper is nailed to this to get a realistic ballasted roadbed effect. The rails are scaled 00 gauge stock laid on balsa ties. Nail the rail to about every eighth or tenth tie with small brass escutcheon pins. The third rail can be made of standard stock supplied by model houses or with radio bus bar. To test the locomotive it will be necessary to run long wires to the motor to

[*Continued on page* 124]

AFTER-DINNER PROJECTS

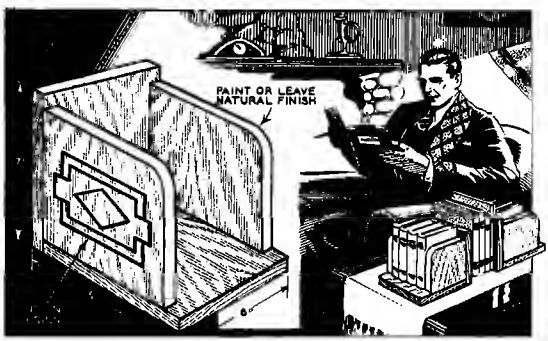


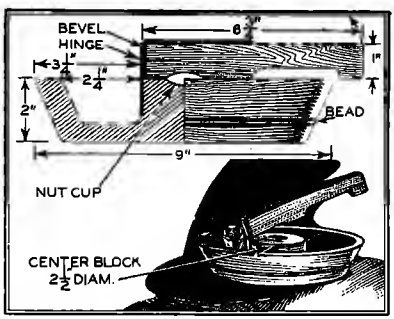
Pegs Separate Neckties On Novel Holder

WOOD pegs set into the upper arm of this attractive wall type holder keep the neckties separate from each other at all times. The lower arm, swinging independently of the other, may be used for scarfs and other small objects. Construct the holder from either walnut or maple, sanding each part carefully, assembling with the single wood peg hinge, and then finishing with enamel or varnish to match the color scheme of the bedroom. Drill and countersink holes for the two mounting screws, then cover the screw heads neatly with plastic wood. Two more arms may be added if more space for ties is needed.—D. Loudermilk.

Make Books Serve as Bookends

BOOKS placed in a simple yet attractive rack type holder here provide the necessary weight to hold other books. The most commonly used books are placed in the end compartments. Use the best hardwood obtainable for the racks, as their effectiveness depends upon the beauty of the wood and finish rather than upon an elaborate design.—E. L. Elmer.



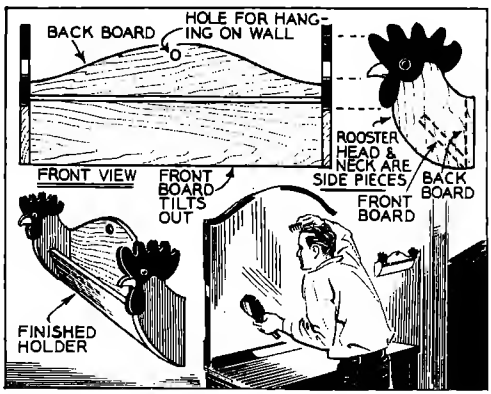


Turned Walnut Bowl Has Built-in Nutcracker

INGENIOUSLY powerful is the nutcracker built into this attractive holiday season bowl. Glue up a walnut block 2″ thick and 9″ in diameter, then turn it down on a lathe to the dimensions shown, leaving the wall of the bowl about ½″ thick. Construct the lever from walnut, hollowing out in it a cup corresponding to that in the center of the bowl.—G. E. Van Horn.

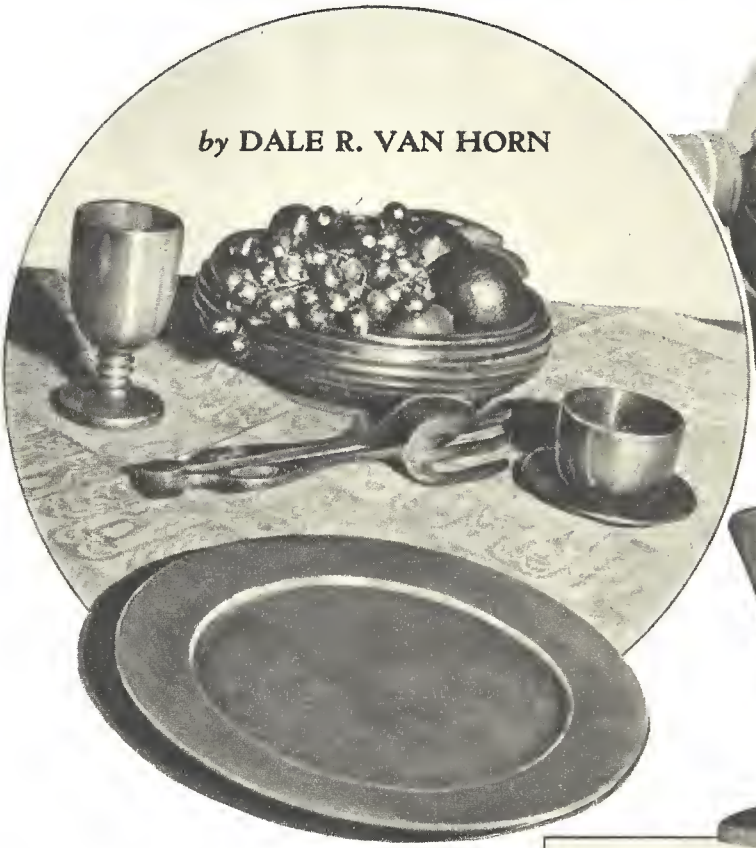
Novelty Comb Holder Is Jigsaw Project

FEW tools other than a jigsaw are needed to build this handy comb holder for the bedroom or bathroom wall. Quarter-inch plywood is best here, but ordinary apple box wood is quite satisfactory. Dimensions are not important; the back may be 9″ long and 4½″ high. Cut-out rooster heads form the sides, while a 2″x9″ front board mounted at an angle completes the tray. Assemble with small brads. Paint or enamel the finished job in white or tan, making the rooster combs a bright red.—M. G. Winterton.

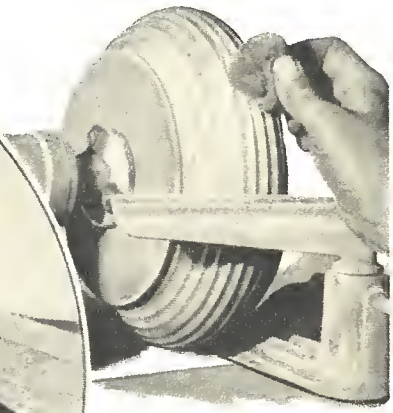


A WOODEN DISH LUNCHEON SET
For Your Workshop Lathe

by DALE R. VAN HORN



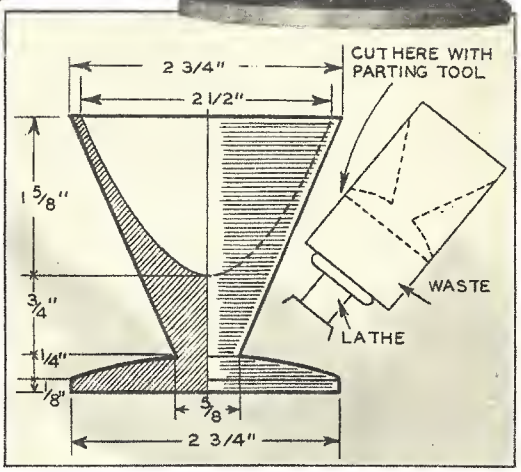
This ensemble of wooden dishes will add much to the charm of luncheons. Set makes an ideal Christmes gift from the workshop fan. At right is dessert dish not shown with set.



Rub bowl lightly with fine steel wool after each coat of lacquer which is put on while on the lathe.

THE popularity of wooden dishes continues. What more appropriate project can be found for gift or home use than such a set? These handsome sets can be used for display or for special dinners and luncheons. In the latter case the wood must be soaked in hot linseed oil, to make them impervious to water.

Plans here show the construction of a fruit or nut bowl, a plate, goblet, cup and saucer, salad server, and dessert dish. There is almost no end of variation if you wish. Inlaying thin strips of wood of a contrasting color, or a motif such as one's initials in the center of each dish, will add to the set's appearance.



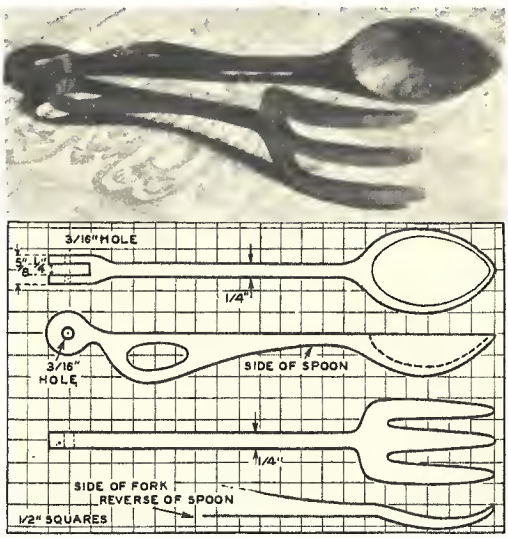
This section end elevation drewing gives dimensions for dessert dish in photo above. If worker wishes to use template drawing can be squared, enlerged to full size, and a template from tin cut for checking the turning on the lathe.

Turned Fruit or Nut Bowl Has Fluted Design

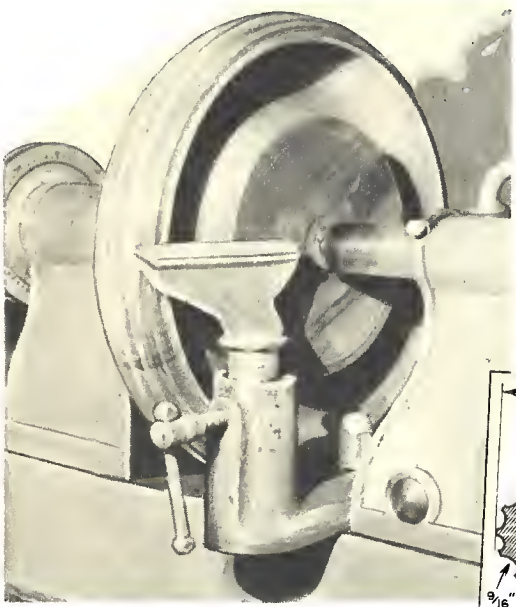
Starting with a block of figured gum 3 inches thick and 10½ inches square, the bowl is first of the group to turn out on the lathe. Use the medium size face plate, using screws which project not over ½ inch into the wood. Turn inside and outside slightly oversize, for warp is bound to occur and after the strain is released by cutting out most of the wood, you can go over the piece again with sharp chisels, and finish. A bit of warp may occur later, but if the wood is filled and finished promptly, and friction heat kept as low as possible when sanding and polishing, this won't be noticeable.

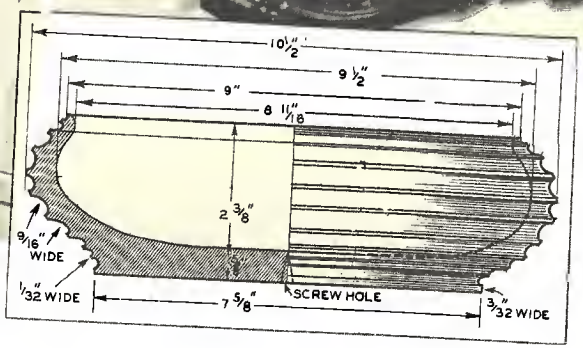
The drawing shows section and elevation of the bowl and the photos show the method of turning. Even though the block is securely screwed to the face plate, retain the tail stock center as long as possible as this minimizes vibration. A half inch gouge will work best for turning the flutings. Sanding can be easily done by rolling the sandpaper around a small dowel, and working it back and forth and slightly sideways as the bowl turns.

After sanding has been finished, fine steel wool is applied. Gum, being close grained, does not necessarily require a filler, but it will



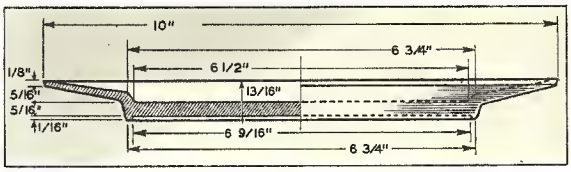
Fork and spoon are dowel-pinned together to form the salad server shown in photo and squared drawings above.





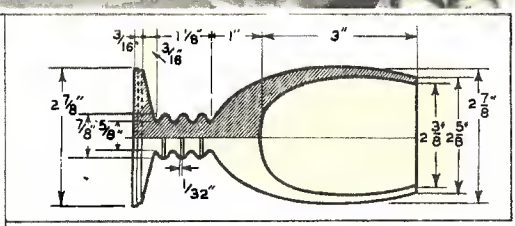
Above—Start of inside bowl cut. Retain tail stock center as long as possible to reduce vibration until bowl is turned. Right above—Bowl after polishing still fastened to face plate. Right—Dimensions of bowl. Design can be changed to suit. Fill the screw hole.

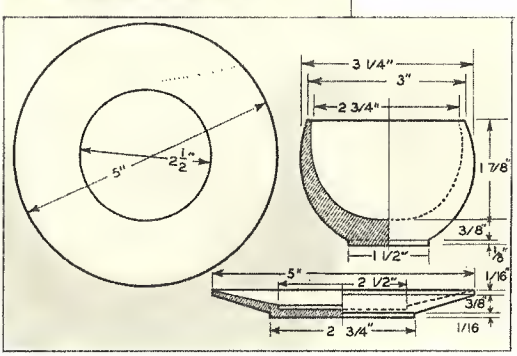
Seven Wooden Dishes Used in This Luncheon Set



At left is the finished plate ready to be cut from face plate after turning end polishing to dimensions given above. All disbes cen be made from walnut, gum, meple or birch. Turn plate from block of wood 1¼" thick and 10" square. Extre thickness permits turning of bottom efter comple-. tion to eliminete screw holes of face plate. Turn slightly oversize to avoid warping. Keep friction heat low.

Cup and saucer (left) are turned on small fece plete to dimensions given below. Goblet cen be sanded by putting sandpaper on round wood block after turning to size et right. Goblet proper is turned first and sended, then stem and base are turned. Send and polish goblet on lathe.





help. With the bowl still in the lathe apply three coats of lacquer, permitting each to dry thoroughly. Rub lightly with steel wool before each coat is applied. A piece of felt should be glued to the bottom of the bowl when finished.

For the plate you will need material 1¼ inch thick and 10 inches square. This extra thickness permits turning off the bottom after completion, thus eliminating the unsightly screw holes. Sand the center of the bottom of the block smooth, then turn the piece tightly on the screw center face plate and turn to the dimensions shown in the drawing. With this piece, warping is bound to occur, so turn slightly oversize first as was done with the bowl. The half inch protrusion next to the face plate is turned down to a small diameter at slow speed with the parting tool. The lathe is then stopped, and a skew or a sharp knife turned up edgeways to make the final cutoff and leave a smooth bottom.

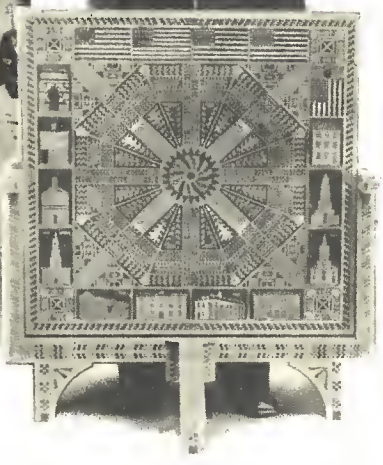
The goblet is not as difficult as it may seem. Long handled chisels with sharp cutting edges, plus rigidity, are the chief requirements of a smooth inside cut. If you choose to carry the fluted idea over to the plates, you can work shallow flutings in the top side of the rim and also work one concave cut on the under side.

The goblet stock comprises a block 6½ inches long and 2⅞ inches square. This

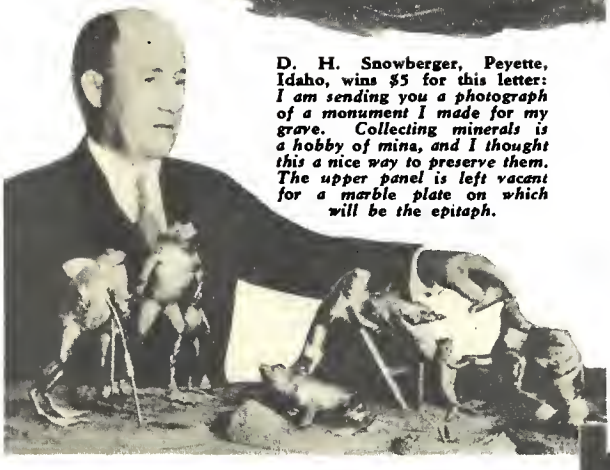
[*Continued on page* 128]

With the COLLECTORS

A collection of entiques ranging from skulls end fossils to century-old prisoner perdons makes the gesoline service stetion of A. O. Rayner, 76-78-80 York Street, Sale, Victoria, Australia, one of the oddest in ibe world. On wells of station ere netive weepons, antiques, and models of ellkinds. Reynor would like to correspond witb other collectors.



Woods from every state in the union and from 56 foreign countries were used by John L. Breth (ebove) in building bis remarkable inleid table. At the top, essembled with tbousands of wood fregments, ere the Betsy Ross flag, tha flag of 1812, the fleg of 1861, end today's fleg; along the sides end bottom ere historic buildings which George Washington visited.



D. H. Snowberger, Peyette, Idaho, wins $5 for this letter: *I am sending you a photograph of a monument I made for my grave. Collecting minerals is a hobby of mine, and I thought this a nice way to preserve them. The upper panel is left vacant for a marble plate on which will be the epitaph.*

CASH PRIZES FOR HOBBY PHOTOS

$5.00 cash prizes ere awarded each month for the most interesting photographs of collections. Take a picture of thet stamp collection, sbowing ell the elbums, the boxes of duplicetes, end all the accessories; photograpb thet coin collection, those thousands of match peckets, or wbetever else you are collecting. If possible heve someone else take the picture so you can be in it, too. Only clear snepshots can be reproduced on this page—send 4x5 enlergements if you can. Describe your collection briefly in e letter. Address Hobby Editor, Modern Mechanix Pub. Co., Minneepolis, Minn. Send return postege if you wish your pbotos returned.

Collecting the largest bullfrogs in the world is the unique bobby of Dr. W. A. McGuire of Cempbell, Mo. Skilled in taxidermy, he carefully preperes frogs to preserve the skin and coloring, stuffs them to bring back the original sbape, end then mounts his specimens in comical positions as boxers, invalids, dudes, etc.

The South See islend possessions of Englend celebrated the Silver Jubilee of King George V witb surcharges over regular stamps. For e few cents stemp collectors can obtain the beautiful New Guinea, Niue, and Pepua beauties shown at the rigbt.

Every 1935 NATIONAL TRACK Championship

WON BY HARLEY-DAVIDSON!

Never before in motorcycling history has such a complete and sweeping victory been won by a single make of motorcycle. Yet the Harley-Davidson topped its marvelous performance by establishing four new American Motorcycle Association records! . . You may never intend to go in for races, hillclimbs and other competition. But when you own a Harley-Davidson, you know it's got what it takes to WIN! Rugged power, great speed, and the "class" in style that every rider wants these days.

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Interested in motorcycling. Send illustrated literature. Postage Stamp is enclosed to cover cost of mailing.

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My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. Check your age group.

PARAGRAPH ODDITIES OF SCIENCE

COFFEE BEANS came to the rescue when an American locomotive, shipped to the jungles of South America, could no longer get coal. — Edmund Mikulski, Jersey City, N. J.

Death nearly overtook the man who forgot to breathe. An English scientist ridded his body of carbon dioxide, the amount of which present in the system determines the extent of breathing. With none present, breathing stopped, and he forgot to start again.

The weight of air at a depth of 26 miles is sufficient to float wood.—John Strange, Frankfort, Ind.

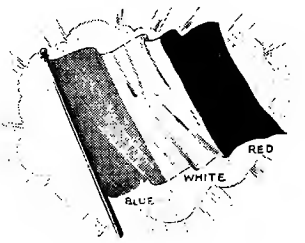
Bells do not have one note, but five, and each note must blend with the other for perfect tone.—J. E. Felher, Bethlehem, Pa.

A rock on the island of St. Lucia is recognized by England as a ship of war. English sailors defended Diamond Rock with such great valor that the Admiralty titled it H. M. S. Diamond Rock.—C. J. Bentcliff, Chicago, Ill.

The northern city of St. Johns, Newfoundland, is closer by sea to Buenos Aires, Argentina, than Jacksonville, Fla.—R. Creps, Prospect, Pa.

Chemical changes in green hay produce billions of electric ions which pave the way for a stroke of lightning. The haymow serves as a giant storage battery while hay is in the process of curing.

When certain colors are combined, an optical illusion results which makes colored areas appear out of proportion. To compensate for this, the three stripes of the French flag are in proportion of 37 for red, 33 for white, and 30 for blue.—H. A. Miller, Irvington, N. J.



The offer of $1,000 for a pound of manufactured comb honey has been standing for years with never a producer to put in a claim for it.—Claude Rathbun, Walton, N. Y.

By strengthening the grip in one hand, the grip of the other is automatically strengthened. —T. Smith, Zion, Ill.

The seed of the common pansy is worth more than its weight in gold, often selling for more than $40 per ounce.—Laurence Bennett, West Webster, N. Y.

Lake George, Alaska, a body of water 100 feet deep and covering more than 100 square miles, disappears annually. It is dammed by a glacier which melts every year, permitting the entire lake to drain away.

Mercury can be siphoned through a solid rod of lead much as water is siphoned through a tube. The first drops will begin to fall in from 12 to 24 hours.—E. W. Blank, Jersey City, N. J.

One dollar will be paid on publication for every Paragraph Oddity accepted. State source or proof. Do not include Oddities with contributions or letters for other departments. No items will be returned.

But Pete is soon pimple-free and "out stepping"

HELLO, UNCLE JACK.--WHAT ABOUT YOU AND AUNT MARGE AND ME SEEING A MOVIE TONIGHT?
SURE--IF YOU LIKE. I THOUGHT YOU'D BE STEPPING OUT WITH SUE, THOUGH!

NOT WITH THESE BRIGHT NEW BLOSSOMS ON MY FACE!!
PIMPLES? LISTEN TO ME, BOY--WHEN I WAS YOUR AGE, I CLEARED UP MY SKIN WITH FLEISCHMANN'S YEAST. GIVE IT A TRY

Don't let adolescent pimples make a hermit out of YOU!

Between the ages 13 and 25, important glands develop. This causes disturbances throughout the body. And waste poisons in the blood irritate the skin, causing pimples. Clear these skin irritants out of your blood, with Fleischmann's Yeast. Then the pimples disappear. Eat 3 cakes a day, before meals, until skin clears.

—clears the skin
by clearing skin irritants out of the blood

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Suez Canal—Keystone of War

[*Continued from page* 63]

a gigantic pincers. Although successful in early engagements, mountainous country delayed the advance. In some sectors Italian troops had to be supplied with drinking water shipped miles by truck.

Mussolini's plan evidently was to bring Ethiopia to terms before the League had an opportunity to act. He probably reasoned that should the League or Great Britain blockade the Suez, his forces could carry on in Ethiopia for a time even though cut off from the mother country.

Meantime, should European nations take military measures against Mussolini, the Italian air fleet, second only to the United States, could attack the British fleet concentrated in the Mediterranean. Such tactics would prove to be the first major test of the warship versus the airplane. If successful in this maneuver, Italy might attempt to seize the Suez with a land force operating in the Sinai peninsula.

In addition Italy could proceed to blockade the Mediterranean in her own way. Her naval force, judging by World War standards, is inferior to Great Britain's. From the modern viewpoint, this apparent inferiority may be equalized somewhat by its new, light, fast cruisers, destroyers and submarines and its fleet of 1,800 military airplanes.

[*Continued on page* 160]

ADLETS FOR HOBBYISTS

(See regular classified section for rates and other information.)

STAMPS

DEAD KINGS and Presidents are sometimes honored by their nations on mourning stamps. The United States started this in 1862 by issuing the now very scarce Black Jack Jackson. Recently there appeared four famous mourning stamps for Marshall Pilsudski (Poland), King Albert (Belgium), Hindenberg (Germany), King Alexander (Jugoslavia). Most Mourning stamps are "good" and become more valuable later. We offer all these four as well as "Saar Comes Home" plebescite stamp for only 10c to approval applicants. GLOBUS STAMP CO., 268 4th Ave., Dept. 150, New York, N. Y.

SUPER-WONDER Packet Offered, containing 60 different stamps from Ethiopia, Brunei, Transjordania, North Borneo, Zanzibar, Sudan, Macao, Iraq, Charkhari, French and British Colonies, including natives, beasts, ships, etc. (No Europe), all for 10c to approval applicants. Big illustrated lists included. Kent Stamp Company, Box 87Z, Brooklyn, N. Y.

PRESIDENT murdered! King assassinated! Patriot hanged! Czar shot by firing squad! Beautiful woman burned at the stake! All above and more, included in Horror Packet—stamps picturing notable men and women who have horribly met violent death! Only 5c, approvals included. Thole, Box 86H, Jamaica, N. Y.

YOU'VE tried the rest—now get the best! "Challenge Collection," including Cape Goodhope, Triangle, Thessaly Octagonal, Commemoratives—10c with approvals. Free Airmail Collection, additional premiums given regular customers. Bargain Stamp Service, 905 West Fifth, Los Angeles, California.

50 DIFFERENT Stamps cataloging over $1.00 only a dime to approval applicants. 20,000 different stamps at prices ranging from 1c. All stamps guaranteed genuine. A fine selection of U. S. revenues at 1c and up. Address F. G. Stein, Dept. 214, 7360 N. Seeley Ave., Chicago.

SCARCE Iceland Airmail Triangle and fine packet of 60 different stamps, including Ubangi, Chad, Gabon, Inini. St. Pierre, Togo, Senegalsavages, ships and animal stamps. Only 5c to approval applicants. Potomac Stamp Co., Dept. 912, Washington, D. C.

MAMMOTH Mystery Packet rare stamps only 10c to serious approval applicants, also valuable free premiums with every selection afterwards. Our stamps are better, our service is different. Fair-Play Stamp Service, 1215 Browning Blvd., Los Angeles, Calif.

105 DIFFERENT STAMPS including such stamps as Belgian Picard Balloon, Spanish Ship, Crete Insurgent, Italian Commemorates, Wurttemberg Pictorial all for 10c to approval Applicants. Swedell, 3129 Garfield Ave., Minneapolis, Minn.

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COMPLETE COLLECTION Every Western Hemisphere mainland country including Silver Jubilee, Airmail, Triangle. 10c with Mutual Profit Sharing Approvals. Mutual Stamp Service, Box 666, Ventura, Calif.

AIRMAILS—Brazil, Chile, Colombia, Ecuador, Mexico—all for 10c with double premium approvals. Progress Stamp Service, 235 South Hope, Los Angeles, California.

SENSATIONAL OFFER!! Six grotesque Mongolia—free to approval applicants enclosing 3c postage! Viking Stamp Co., Williamsburgh Bank Bldg., Brooklyn, N. Y.

STAMPS! 100 diff. 3c; 500 diff. 35c; 1,000 diff. 90c! Illustrated Album (4000 spaces) 22c. Approvals sent. Tatham Stamp Co. (D9) Springfield. Mass.

AMAZING VALUE—35 different U. S. Early, Commemoratives. Air Mail, etc., 10c to approval applicants. Stamp Shop, 817 Holland Bldg., St. Louis, Mo.

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COLLECTORS Sell Your Stamps. Guaranteed buyers listed in the selling guide. $1.00 postpaid. Royal Bookco, Box 36, Baisden, W. Va.

STAMPS, Albums, Approval Cards, all prices. 10c for fall bargain list. J. Mack, 36 Thornton, Buffalo, N. Y.

SENSATION: Airmails from 10 countries; U. S., South America; Pictorials 10c. A. Steele. Springdale. Pa.

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Communication Telephone, cable, radio, telegraph, teletype — all these swift messengers would be lost to us without Electricity.

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New price **$1.00** POSTPAID

Niagara Falls Lamp

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Send $1 bill or money order for prompt shipment, postpaid. PRINT your name and address plainly. No lamps shipped C. O. D. or on approval. Order as many as you want. Dozen lots $10.00.

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HOW IT WORKS—A striped cylinder revolves about a striped electric lamp, casting an ever changing pattern of light and shadow through the translucent outer shade. This creates action in the picture real as a colored movie. An interesting, unusual and beautiful lamp for any home. Heat is the only motive power.

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Like turning lead into gold, here is a business with gigantic possibilities. Factories, Clubs, Stores, Schools, Homes, spend millions every year for rubber mats. Think of your profit when a

HAND MACHINE and

5¢ TIRE MAKES $2.00 MAT

Brand new. Fully patented. Few men already started report unprecedented success. Wm. Eagle writes, "Can't make mats fast enough. First week brought over 200 orders for $1.00 to $10.00 each." Flash from Harris says: "Orders enough to keep 15 men busy all the time." Gunter got big order from County Commissioners and now reports: "Just signed up order for all grade and high schools." No wonder responsible men are throwing everything aside to establish local FABRIX factories.

COSTS NOTHING to get complete facts. Just send name and address. We'll send description of simple hand machine that quickly slices old tire into strip; show you how patented method forms strips into thick, springy, long-wearing FABRIX Mats—how five cents worth of Junk Tires makes $2.00 Mat; how you can start on a reasonable investment and build a business so big, so fast, that it will take your breath away. Don't delay a minute. Write or wire today. All information is free.

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Positively the greatest bargain ever offered. A genuine full sized $100.00 office model late model Underwood No. 5 for only $39.90 (cash) or on easy terms. Has up-to-date improvements including standard 4-row keyboard, backspacer, automatic ribbon reverse, shiftlock key, 2-color ribbon, etc. The perfect all purpose typewriter. Completely rebuilt and FULLY GUARANTEED.

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Complete (Home Study) Course of the Famous Van Sant Speed Typewriting System—fully illustrated, easily learned, given during this offer.

Lowest Terms—10c a Day

Money Back Guarantee

Send coupon for 10-day Trial—if you decide to keep it pay only $3.00 a month until $44.90 (term price) is paid. Limited offer—act at once.

INTERNATIONAL TYPEWRITER EXCHANGE,
231 West Monroe St., Chicago, Ill., Dept. 1205

Send Underwood No. 5 (F. O. B., Chicago) at once for 10-day trial. If I am not perfectly satisfied I can return it express collect. If I keep it I will pay $3.00 a month until I have paid $44.90 (term price) in full.

Name .....Age .....

Address .....

Town .....State .....

Preserving Bagged Game

[*Continued from page 73*]

ducks will freeze solid is recommended. Since such weather is not always to be met with it is best to keep the ducks as stated and prepare them for the refrigerator after you come home. In either case the duck is cleaned thoroughly inside and out, head and legs trimmed off at the joints, treated to the soda wash, then dried and wrapped in a cloth soaked in vinegar after which it is put into the refrigerator where it will freeze hard as rock.

Partridges, prairie chickens, pheasants, quail, etc., should all be drawn as soon as possible after they are killed, which is all the more true if the weather is warm. The craws or crops of all game birds should be taken out at the same time the bird is drawn.

Draw Rabbits Immediately

Regardless of the weather, rabbits should be drawn as soon as possible after they are killed, likewise being bled. The cavity can then be stuffed with dry grass.

We generally associate deer hunting with the first snows and rather cold weather. The truth of the matter is that one is often caught with venison in fine weather following on the heels of a cold snap. Most certainly a deer, under circumstances of the sort, should be cut up and each piece retained should be sealed from the air by wrapping it in heavy paper, the same then being kept in a cool place, a hole in the ground as previously described for ducks.

After skinning the deer, the hind quarters are carefully cut off up close to the body, the bone being severed at the joints. The legs are lopped off. The body is now cut its full length along the backbone with a sharp camp axe. It is then easy to cut up the sections. A washing in soda and a final wrapping of the chunks in cloths with vinegar on them is a good idea, these cloths being left on even though wrapped in paper.

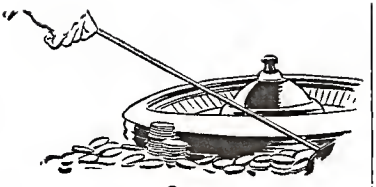
Hang Deer With Head Up

If the weather is cool to cold a deer is generally hung up as soon as one gets in camp with it. Most deer are hung by the hind legs. It may be stated, however, that for the purpose of butchering a deer, it is much more readily dressed when hanging head up. The entrails come out easily in this position, also the animal can be bled much better. Insert the stick back of the fore-legs, above the knees, between bone and sinew. Do not hang a deer by a rope thrown around its horns, which is rather an amateurish way of going about it.

Generally a deer is permitted to hang three days before it can, with safety, be eaten by all persons.

What applies to deer likewise applies to the moose, caribou and other big game.

You take a chance



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New FUEL ECONOMY — New QUIETNESS!

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Here's the year's most sensational home-heating announcement! A New, Marvelously-Perfected Oil Burner by LACO . . . that gives you Perfect, Uniform-Temperature, Automatic OIL HEAT . . . Cheaper than Coal in most localities . . . now Quieter than ever before . . . and which you can own at a price that SAVES YOU ABOUT $100!

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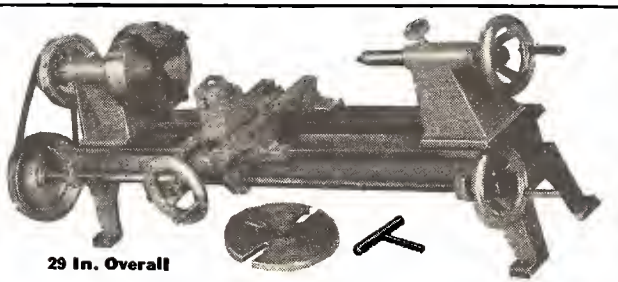

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LOOK . . . double wetproof.

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LOOK . . . recognized Standard Brands of progressive burning powder.

LOOK . . . patented Kleanbore primer that won't rust or pit the barrel.

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BALANCED PATTERN

IT'S no accident that Nitro Express Shot Shells bag more game. They're built to give a *balanced pattern*—a uniform spread that holds true for 40, 50, 60 yards or more.

Equally important to water-fowl shooters is the downright reliability of Nitro Express Shells under all shooting conditions. In tests they've been soaked in tubs of water, frozen and kept in ice for days—yet they came through with their full long-range smash when the firing pin hit their non-corrosive Kleanbore primers.

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Remington

DUPONT
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Bedding Down the Deer Hunter

[*Continued from page 71*]

The U. S. Forest Service sleeping bag is provided with snap fasteners in preference to the zipper type. These snap-button fasteners have been found most satisfactory by the government in that the bag is securely closed, thus warding off the danger of clogging from ice or dirt. So far as warmth is concerned it is equal to five double wool blankets of top grade. A three-quarter length air mattress that inflates to a three-inch thickness is generally used with the forest service bag.

Air Mattresses Cold in Winter

It is a fact, however, as regards air mattresses, that in cold weather they tend to conduct the cold to the body in a way that is far from pleasant, hence they are included only as regards soft comfort to sleep on, and in as they may be placed *outside* and *under* the sleeping bag arrangement, with a blanket or something over the same to stop the soaking of cold into the body. The air mattress is not, in any sense of the word, a winter proposition.

The eider-down sleeping bag is ideal for use when sleeping in a lean-to, with a fire in front of you, and a thick balsam mat underneath. The eider-down bag, however, is far more expensive than the Forest Service type of bag. The common practice in the north is to carry some manner of soft fur about three feet in length, sewed down the side, fur in, with the two ends open. Before getting into the bag this is pulled over the legs up to the hips, after which you button yourself into the bag. It may be mentioned that the so-called sheepskin moccasins (the same having the fur inside), add just that much more warmth to the feet.

Head Protection Important

Head protection when sleeping out in an open shelter is another something that should be given due attention. A cool head may be all right, but a cold one is the direct opposite. The practice, generally followed, is to have on some manner of wool stocking cap, which same may be pulled down and held under the chin with an elastic. Add to the above arrangement a goose- or duck-feather pillow, which will permit the head to sink into it, and just about the ideal arrangement is reached.

There is no gainsaying the value of the fire in front of the shelter. Generally the rule is to get a very hot bed of embers and to shove on several green logs in combination with the dry ones on retiring. Gnarled, knotted logs are by far the best as these burn slow, and hold their embers twice or three times as long as ordinary straight-grained logs.

"Gasless" Touring in a Diesel Auto

[*Continued from page* 38]

manufactured on a production basis comparable to gasoline motors, naturally makes a Diesel powered car higher in its original cost. Your average pleasure car, selling for $1,500, would cost around $2,200 with a Diesel engine.

Admittedly this difference in cost is at present a handicap to the widespread use of Diesel pleasure cars. Nevertheless, the saving in fuel constantly whittles down this disparity in original cost, so that the differential is made up in two or three years of average driving. But there are other advantages than operating economy which favor the Diesel.

No Spark Plugs Are Needed

No electrical system is used. Carburetors are eliminated, as are vacuum tanks, fuel pumps, and batteries. It is estimating the matter conservatively to state that 75% of the repairs on a gasoline engine originate in these accessories, all of which are eliminated by Diesel design. The trouble-free operation thus attained is obvious.

Any mechanic who is an efficient gasoline engine repairman can, with a little study, handle the maintenance of a Cummins Diesel engine. The cooling system is identical with that employed in conventional gasoline design—that is, a radiator and water pump circulate the cooling water around the cylinder head. But there is this important difference: In the gasoline motor, water carries heat generated by the fuel explosion to the radiator, where it is dissipated and wasted. In the Diesel, because compressive heat is the operative principle of ignition, most of it is absorbed as useful energy, not only making for economy but insuring a remarkably cool-running motor and adding greatly to its life. In fact many Diesels in trucks are operated without fans.

Diesel Has Quick Getaway

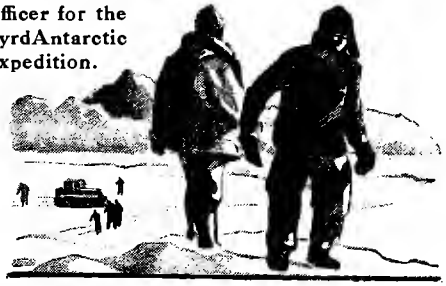
In flexibility of operation—quick getaway—there is little to choose between Diesel and gasoline, but what difference there is favors the Diesel. I recall an occasion when my Diesel car came to a stop sign alongside a costly automobile belonging to a friend, fitted with a supercharged gasoline motor. We decided to test Diesel pickup then and there. My car pulled ahead of his with gratifying ease. Of course, his supercharged motor had a top speed of better than a hundred miles an hour, and he made up the distance, but the Diesel performance was revealing.

Dr. Rudolph Diesel, the German scientist, began his experiments with the engine which bears his name back in 1885. Why, you may

[*Continued on page* 125]

"MOTORING"
at the bottom of the world

As related by Stevenson Corey, Chief Supply Officer for the ByrdAntarctic Expedition.



"On March 28, 1934, the men had to abandon one of the tractors out on the trail. It was 62 degrees below zero, and after six hours of work they gave up trying to get the motor started . . . ignition trouble."

". . . on January 8, 1935, the men went back over the trail and dug the tractor out of the snow and ice. Although it had been out there for *nine months* in weather as cold as 77 degrees below zero, the Eveready Prestone in the cooling system had kept it protected against freeze-up. That was a real test of an anti-freeze . . ."

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"Tiny Tom" a Real Locomotive

[*Continued from page* 109]

permit the model to run on the track or a temporary collector can be fixed to the cab to touch the third rail. One wire from the battery goes to the third rail and the other to either one of the running rails.

The pilot truck is next. Its construction is covered completely in Fig. 13.

Small holes are drilled into the boiler and brads inserted up to the head and soldered so that they extend about $\frac{1}{16}$" from the shell of the boiler. Solder $\frac{1}{32}$" copper wire along the heads around the front of the boiler to represent a hand rail. The two air pump cylinders are turned out to the dimensions shown in Fig. 18.

The cowcatcher assembly is shown in Fig. 15. Cut the apron and frame from 22-gauge brass and solder to the bolster which is $\frac{1}{16}$" brass. The spokes of the cowcatcher are common pins with their heads clipped off, soldered to the frame and the bolster. Cut the coupling from brass and solder to the bolster.

Scrape away bits of solder, clean with gasoline, and apply a thin coat of flat black paint to complete your "Tiny Tom" locomotive. The construction of the tender will be covered in Part III next month. Blueprints for the entire project are now ready, and are described on page 97.

Filming Table Top Earthquakes

[*Continued from page* 44]

Pompeii, Willis O'Brien, who did the technical and miniature work on *The Lost World, King Kong,* as well as this picture, constructed a miniature building of about four by five feet in size on a table. In order to effect an earthquake movement, the table was set on a series of rocker arms operated by an electric motor. The building was constructed of plaster and wood joined together in sections, and was so built that any desired portion could be made to collapse when desired by pulling wires which ran through the building down to the table, and from there to the control board.

In some sea films that show boat wrecks or fires, the work is done by use of miniature. In some instances the boat never touches the water but is run on tracks in the studio sound stage. Recently Ralph Hammeras, who is in charge of miniature photography at Fox Films Corporation, constructed a twelve-foot miniature boat in order to show a fire at sea.

The boat was complete with every detail of an ocean going liner, even to the use of three thousand miniature globes that actually furnished illumination.

The water was added by the "projection process," which projected a moving picture of the desired ocean scene to a screen behind

[*Continued on page* 128]

"Gasless" Touring in a Diesel Auto

[*Continued from page* 123]

wonder, has it taken 50 years for the Diesel to reach a stage where it is practical for automotive use? The Diesel has been used for years in driving ocean liners, electric generators, and for other commercial purposes where low-cost power is desirable and weight a secondary factor.

The answer lies in the fact that the difficulties of Diesel design increase geometrically as size is reduced. In a Diesel delivering several thousand horsepower, the quantities of fuel injected into the huge cylinders are considerable. But in a Diesel of automotive proportions, the fuel charge is microscopic—a mere drop—and when one considers that for a smooth-running engine, fuel must be metered to each cylinder in identical proportions, and injected against a pressure of some 500 pounds, the mechanical difficulties may be imagined. A great many manufacturers of large Diesels do not even attempt to turn out small engines. This problem of fuel injection is the stumbling-block which has handicapped Diesels in the automotive field.

Fuel Injection Problem Solved

In my Diesel car, the fuel injection problem is overcome by a radically different design. Two means of fuel injection are generally used—one is the common rail system, the other the individual pump method. In the latter, a hydraulic fuel pump is provided for *each* cylinder to force the oil in under pressure. These pumps wear at different rates and it is a constant problem to keep them in adjustment. With one cylinder getting too much fuel, and another starved, a rough-running engine results.

The common rail method involves the use of a rail, or pipe header, in which a single pump maintains the fuel at high pressure. Small pipes run from the header to each cylinder, where the fuel is injected through needle valves. Each of these valves must be adjusted to deliver the same quantity of fuel to each cylinder—an almost impossible task in a small motor, considering the wear on the valves and the cams which operate them.

Rotary Disc Distributes Fuel

In my Diesel car, the fuel mechanism is analogous to the electrical distributor on a gasoline motor. A rotary disc in the distributor fuel pump connects with each cylinder in turn—just as the electric distributor arm rotates to supply a spark to gasoline cylinders in the proper order—the sole difference being that instead of handling electricity through copper wires, the Diesel distributor handles fuel oil through copper tubing.

[*Continued on page* 138]

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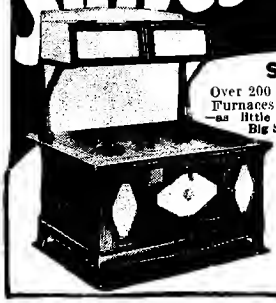

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Care and Feeding of Your Dog

[*Continued from page* 81]

C, D, and F. Dr. Leonard, noted authority on dogs, in his book gives the following explanation of the five vitamins:

VITAMIN A, found in butter, eggs, fat, and leafy green vegetables, is necessary to prevent colds, bronchitis, pneumonia, infections, and stunted growth in young animals.

VITAMIN B, found in wheat, wards against nervous troubles.

VITAMIN C, found in milk, vegetables and fruit, prevents skin diseases.

VITAMIN D prevents soft, improperly developed bones and rickets.

VITAMIN E is of recent discovery. Its absence is the cause of sterility in both sexes. This vitamin is in whole wheat and lettuce.

To assist in the selection of food having the proper vitamins the following table is given. The "x" indicates the relative amount of the vitamin found in a particular food.

	Vitamins		
MEATS	A	B	C
Liver	5x	5x	3x
Heart	4x	4x	x
Kidney	3x	3x	x
Muscle Meats	x	x	....
MILK			
Whole	3x	3x	x
Skimmed	x	3x	x
Evaporated	3x	3x	....
Cream cheese	3x	x	....
VEGETABLES			
Spinach	5x	3x	4x
Lettuce	5x	3x	5x
Beets	....	x	....
Carrots	5x	4x	2x
Dandelion	3x	x	x
Onions	....	x	3x

	Vitamins		
GRAIN	A	B	C
Whole wheat	x	4x	....
Corn meal	....	4x	....
Barley	x	3x	....
Polished rice	....	....	....
Whole rice	x	3x	....
FRUIT			
Oranges	2x	3x	5x
Tomatoes	5x	3x	5x
Apples	x	2x	2x
Peaches	....	....	3x
FATS AND OILS			
Cod liver oil	5x	....	
Butter	5x	....	
Beef fat	2x	....	
Eggs	4x	2x	

Make Own Photo Christmas Cards

[*Continued from page* 95]

they must be washed well. Before drying, place the prints in a glycerine solution (one part glycerine to ten or twelve parts water) for at least five minutes. This prevents the prints from crackling when embossed.

A good method of embossing is to place the prints with slightly moistened back between layers of white blotting paper for a few minutes until they soften. They are then laid over an embossing form, which is a piece of photo paper about a quarter of an inch smaller all around than the card. A round tool is pressed against the edge of the form.

If you wish to produce a single postal card type of greeting card, you can purchase glossy postcard form of paper and by rolling out on a ferrotype tin with a rubber roller, and allowing to dry, the print will pop off with a fine gloss. Never try to peel the prints off the ferrotype tin until they are absolutely dry. They will never have a tendency to stick if a slight film of wax is first applied to the tin and then rubbed off to a polish.

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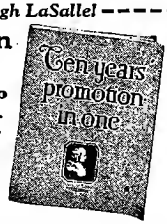

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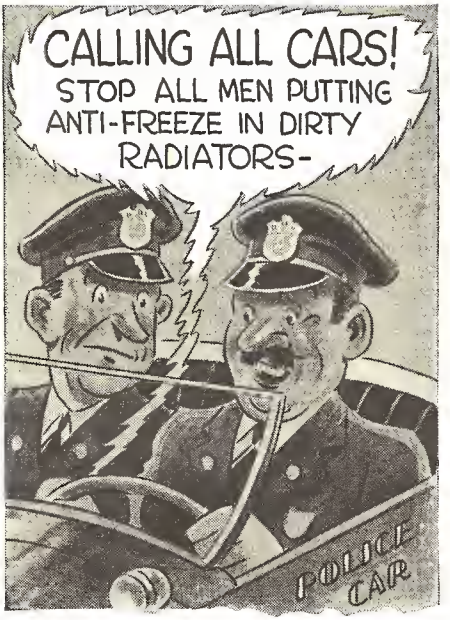

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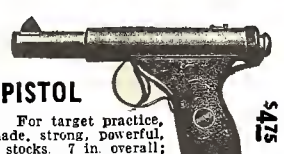

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A Wooden Dish Luncheon Set

[*Continued from page* 113]

length includes 1 inch for waste at the cut-off end after finishing. Mount the block on the medium sized face plate and center the dead center, then turn round. The drawing shows the design. Roughly shape the outside and part of the inside. When two-thirds turned, most of the warp will have showed, so return to size and finish smooth. Finally, back away the tail stock and turn out the center waste from the inside.

With the goblet proper, turned and sanded, turn the stem with flutes, then shape the base, and sand. Also, with the parting tool, turn down through the waste until only 1½ inches remain to cut off. This leaves the goblet rigid enough for polishing. Apply the 3 coats of lacquer and steel wool between coats. After the third coat has been rubbed with steel wool, polish with a cotton cloth. The final step is cutting off. When cut to within ½ inch, stop the motor, holding a cotton cloth loosely in the goblet mouth with one hand, hold the parting tool in position with the other, and have someone turn the lathe slowly by hand until the goblet is cut free.

Turning the dessert dish is easy. Requiring

[*Continued on page* 160]

Filming Table Top Earthquakes

[*Continued from page* 124]

the ship. The camera angle was set so the projected picture of the ocean and the burning ship was combined to show the ship moving in water. In so doing a more forceful and effective action for the story was obtained with no risk to human life.

Things as complicated as a ballroom with dancing couples have been made in miniature. For the *Big Broadcast,* Harry Reynolds, who makes the miniatures for Paramount Studios, brought to life such a ballroom where sixty couples danced the waltz, and an orchestra of men made in miniature to represent the Vincent Lopez Orchestra went through all the motions of producing the music.

To make these miniatures do this was not a simple matter. Harry Reynolds constructed a number of conveyor belts on which were anchored the figures. These conveyor belts ran over drums, which had an intricate tripping mechanism which moved the figures in a certain manner when in a desired position.

The question arises, "Why go to all that trouble when the real orchestra and ballroom would be available?" At times it is thought desirable for picture purposes to photograph at an impossible angle, or photograph in a dangerous position.

[*Continued on page* 130]

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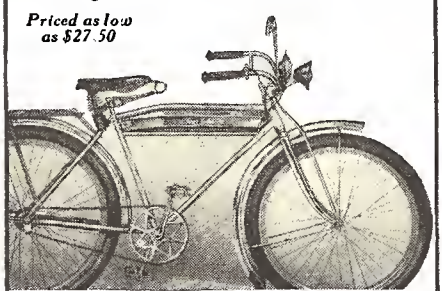

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The Story of Soap

[*Continued from page* 87]

each holding five carloads of soap, and you can understand why one large factory alone uses as many as 250,000 cocoanuts a day.

After the soap has boiled all day, common salt is added with copious quantities of water. During the night the salt water sinks to the bottom, carrying glycerin — a by-product with it.

The soap remains in the kettles for several days of further boiling. An expert soap maker tells when the soap is finished by its appearance in the kettle and by tasting it.

The hot finished soap is pumped from the kettle to the crutcher, and then fillers such as silicate of soda are added to help hold the bar together. From the crutchers it flows to frames, holding from 1,000 to 1,500 pounds of soap, to cool and solidify, after which it is cut into bars.

Fine toilet soap is made of cocoanut, olive, and cottonseed oils. When cooked, it also passes through a crutcher, over cooling rollers, and through a dryer. It then passes into a mixer called an amalgamator, where the perfume is added.

In the mill it becomes quite plastic, the perfume is thoroughly incorporated, and the soap reduced to a fine grain. It is then pressed into bars, stamped, and declared ready for the war against grime.

Filming Table Top Earthquakes

[*Continued from page* 128]

Probably the most difficult of all miniature shots are the type that characterize Willis O'Brien's work; that is, in such pictures as *King Kong*, wherein people in small size are added to miniatures which seem of heroic proportions.

The new "stop-motion" camera is used in photographing miniatures so they may be moved by hand between each exposure while the camera shutter is closed. The process of photographing a miniature by "stop-motion" pose by pose is continued until the desired action is complete. A day's work is often only twenty-five feet of film, which is seen on the screen in about a quarter of a minute. To add real-life persons to the miniature picture, a real-life motion picture is first taken of the persons going through the desired action. Then, the miniature set is made up in which is added a projector screen of a lightly ground glass. This glass blends with the rest of the set in such a way that its presence is not noticed. Now, while the miniature fur-and-steel ape is being moved from position to position in the set around the projection screen, a moving picture of the people is projected one picture at a time.

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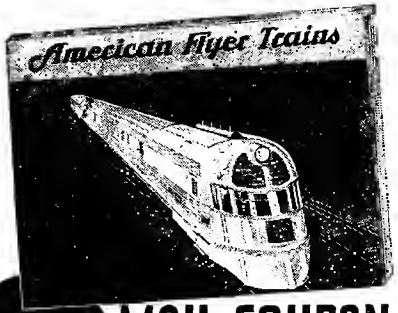

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M. M. Through a Microscope

[*Continued from page* 55]

eye is a geometrically regular arrangement of alternating light and dark areas, the telltale sign of the engravers screen, an ingenious device for the making of halftones. The finer the screen, the more expensive the process and the finer the quality of paper.

In four color process work, a separate halftone block of the subject is prepared for black, red, blue and yellow, all other hues in each case being excluded by the interposition before the camera lens of color filters. When the paper on which the picture is to be printed is run through the presses four times, one for each of the halftone blocks, the result is a reproduction of many hues, quite faithful to the original. Note the isolation or superposition of dots representing various colors in the magnified reproduction here shown.

Try your microscope on banknotes, postage stamps, fine steel engravings, etchings, wood block prints, photographs, and other types of original and reproduced illustrations. You'll find this detecting of methods highly interesting. And it will be very instructive too, if followed up by a bit of reading on the subject in any good encyclopædia.

Joe Louis, Boxing Master Mechanic

[*Continued from page* 65]

just like a poor workman does in a shop.

"I do not scare easily. When a fellow has worked at the jobs I did, he learns to do things by rote. It is a discipline that only a laboring man or a soldier knows.

"I never lose my interest in mechanical things, You see, I'm inclined very much along such lines. I love to tinker and monkey around with gadgets and fix things. At my mother's home in Detroit I have a work room down in the cellar. My tool chest is there. I putter around the place when I have nothing else to do, and I turn out some pretty fair material.

"In fact, when I hang up my boxing gloves and call it quits I may start a manufacturing business of some sort, either in Detroit or Chicago. This would give me something to do, and if I pick the right field I might show a steady profit on my investment."

The boxer's passion for mechanical devices is instantly evident to visitors at his rustic retreat in the wooded Jersey hills. The Louis camp, from gymnasium to kitchen, bristles with gadgets and doodads.

He has a muscle-kneading machine which his coach and trainer, Jack Blackburn, employs upon his young protege after each workout. Joe's dressing room is filled with

[*Continued on page* 142]

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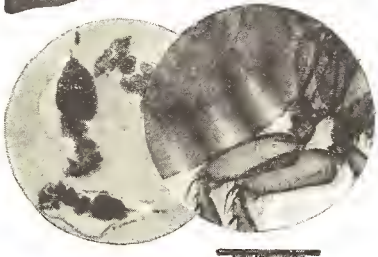

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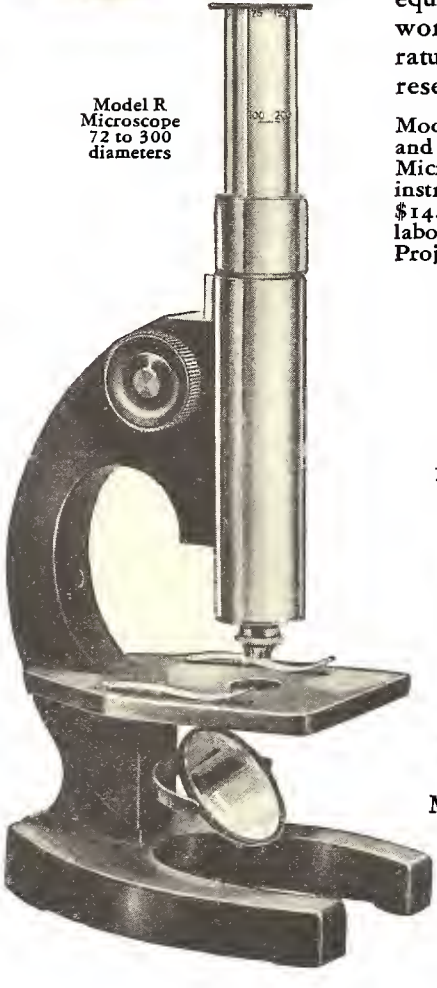

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Broadcasting Football—Ted Husing

[*Continued from page* 53]

has written the names of the players corresponding to their numbers. Thus when Quailey presses, say, Key 13, a light flashes beneath the name "Jackson" and Husing confirms the identity of the ball-carrier.

It's a year round job for Quailey, as he does most of the scouting. He goes out weeks in advance to consult with coaches of the teams whose games they will broadcast, picking up pointers on styles of play, strategy, and abilities of players which more than once has pulled their broadcasts out of a tight corner.

Husing Doesn't Have to Watch Game

Husing's system works so well that on one occasion he was able to broadcast an entire game with the field just a blur before him. Husing wears glasses while working, but on this occasion—it was the Army-Notre Dame game played at Soldier's Field, Chicago, in 1930—he discovered that he had left his glasses at the hotel and there wasn't time to send back for them. It was a dull, sleety day and the figures on the field seemed lost in a haze to Husing, but he put the entire game on the air without an error, thanks to Les Quailey, and the light box.

Husing has no time to relax. When he isn't talking, he is writing a running account of the game with a shorthand system of his own, for the final summary of the game.

Knowing football inside out, Husing fully realizes that it isn't always the grandstander carrying the ball who deserves credit for a touchdown. He is proud of the fact that he is noted for giving credit where it is due, to the men who block out opposing players and so make long runs possible. And he knows, too, how to leave out the non-essentials.

Line Plays Are Difficult to Follow

Line play has always been the weak spot in football broadcasting. The compactness of the line, the confused shifts and pileups, make it extremely difficult to follow. Quailey's glasses never leave the huddle of players piled up after a line plunge until the rôle played by the last man has been analyzed. For his enviable reputation for broadcasting this phase of play, Husing thanks the late Knute Rockne, who once spent a week giving Husing special coaching on this angle of the game.

It's a tense, nerve-wracking game, this business of broadcasting football. The announcer knows that his slightest error will be seized upon by rabid fans. He has no time to go back and correct himself. And always that mike must be in action—it can't be permitted to go dead while the announcer collects his thoughts. No wonder that Husing and Quailey retire after the game is over and lie down for a couple of hours limp as rags.

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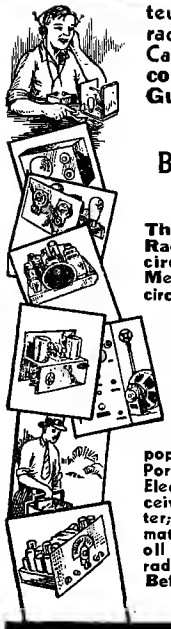

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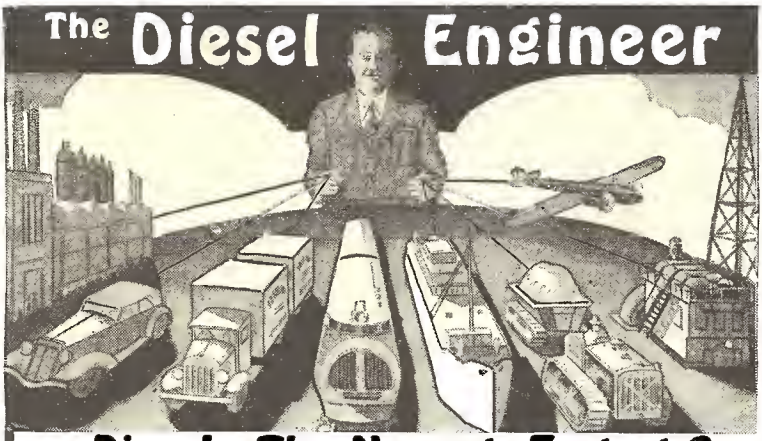

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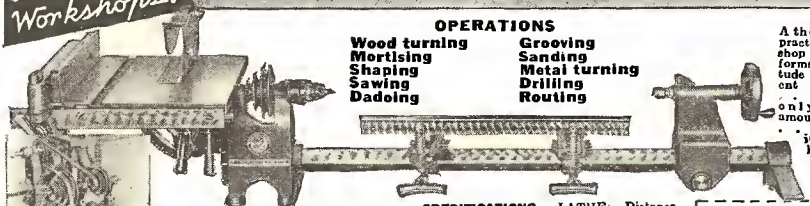

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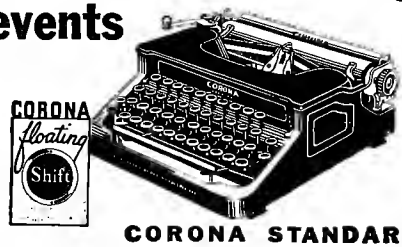

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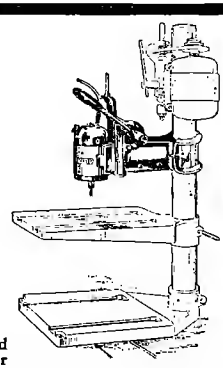

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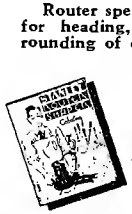

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[*Continued from page* 66]

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"Gasless" Touring in a Diesel Auto

[*Continued from page* 125]

Difficult starting is another Diesel problem which had to be overcome before the motor was suitable for automotive use. In large Diesels, the oil is injected as a wet spray, making for sluggish starting. In the Cummins Diesel, the fuel is preheated with the heat of the first compression and injected as a gas—practically cracked into gasoline—and this, together with the 1,000 degrees temperature of compression created by the first revolutions of the engine, ignites the fuel instantly.

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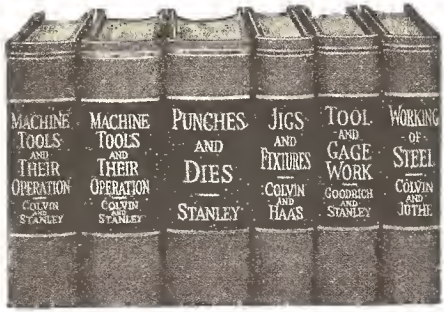

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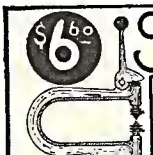

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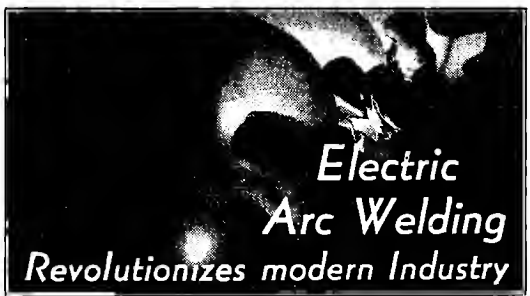

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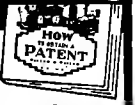

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Inventions Are Needed

[*Continued from page* 83]

such a way that a duplicate ignition system cannot be used by the thief, would solve the problem of stolen cars. The saving such a device would bring in auto theft insurance rates would more than pay for the added cost of such equipment.

Improvements on common household gadgets are ever profitable for the inventor. The window catch or lock now in use must be closed by hand. Many burglaries are committed because someone in the household forgot to lock a window. A snap lock is needed that will automatically catch when the window is closed. This would bring at least $50,000.

Housewives now use steel wool for cleaning the bottoms of pans. A small pot cleaning tool that could be sold for ten cents, yet have none of the disadvantages of steel wool, would be very popular.

Smokers are looking for a streamline pipe that will not burn out quickly in a high wind. Such a pipe should not be freakish. No lid of any sort could be used. Ten million such pipes could be sold to smokers who work out-of-doors, with five cents in royalty on each for the lucky inventor.

Joe Louis, Boxing Master Mechanic

[*Continued from page* 132]

violet ray and baking lamps, heating pads and other mechanized health-giving apparatus.

Louis has added extras to his new car until it represents the last word in mechanical convenience. This rakish vehicle is equipped with radio, speaking tube, writing desk and card table, thermos bottles, picnic ware; a trick seating arrangement that can be converted into a bed—and other conveniences too numerous to mention.

"I want to fight every two weeks this winter," Louis insists. "A fighter gets rusty when he remains idle. I think Jim Braddock will give me a better fight than anybody around today. Schmeling? Well, they tell me Max has a pretty good right hand. Baer told me after the fight that the German is the hardest right hand puncher in the world, not barring myself.

"My easiest fight?" Louis reviewed his meteoric career at the conclusion of this interview. "Primo Carnera! He was big—and that's all. My toughest? Maxie Baer! He was the easiest to hit, but the hardest to knock out. The ones I don't like? Boxers! The sluggers are made to order for me. Who'll give me trouble? A big, fast fellow with a real good left hand! But I don't know one right now, do you?"

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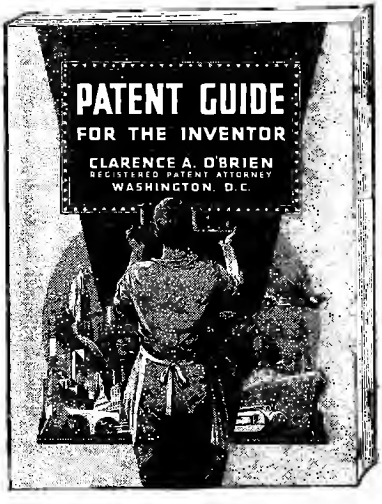

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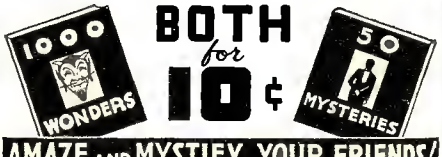

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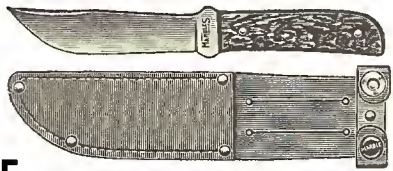

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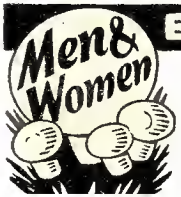

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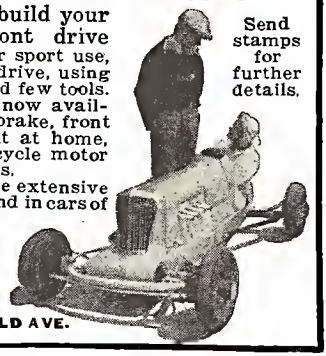

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Of MODERN MECHANIX & INVENTIONS, published monthly at Louisville, Kentucky, for October 1, 1935.

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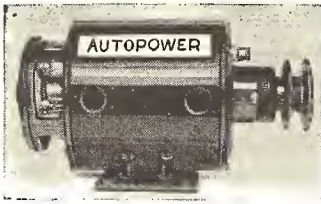

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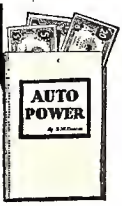

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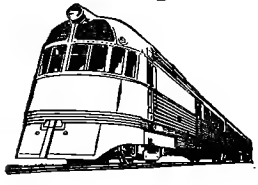

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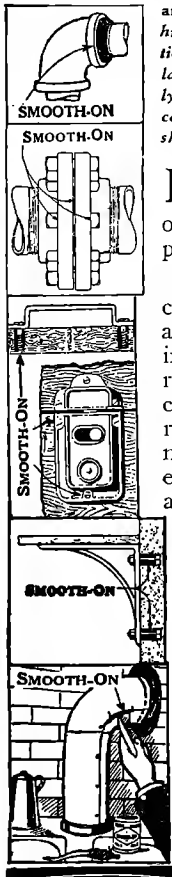

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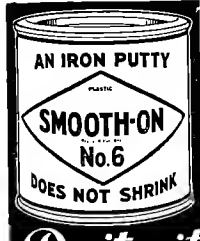

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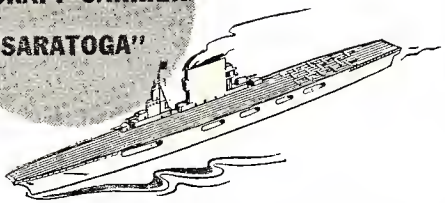

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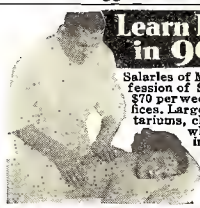

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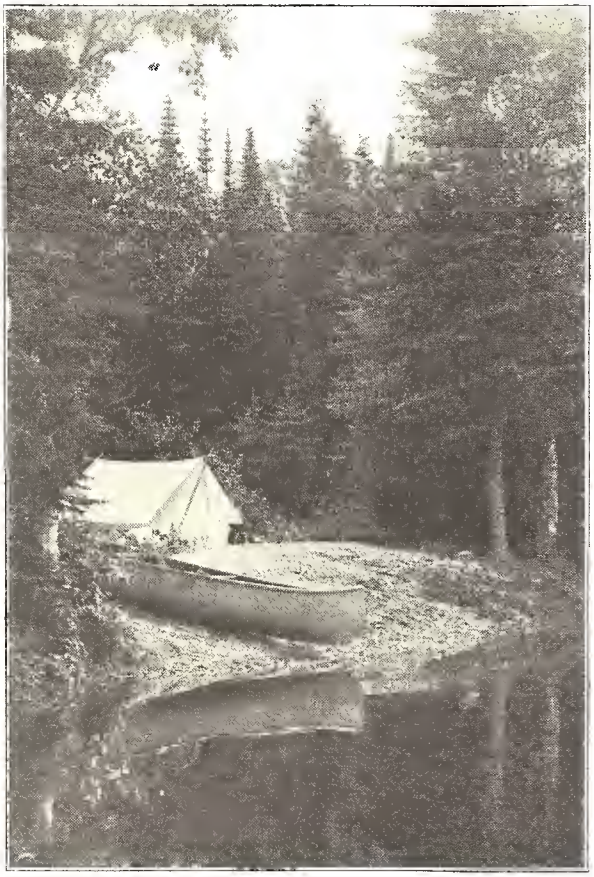

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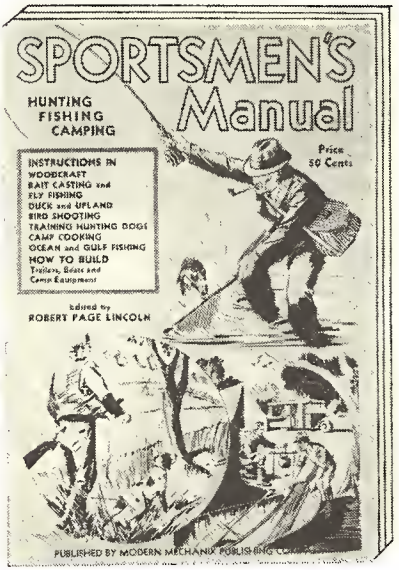

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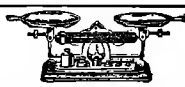

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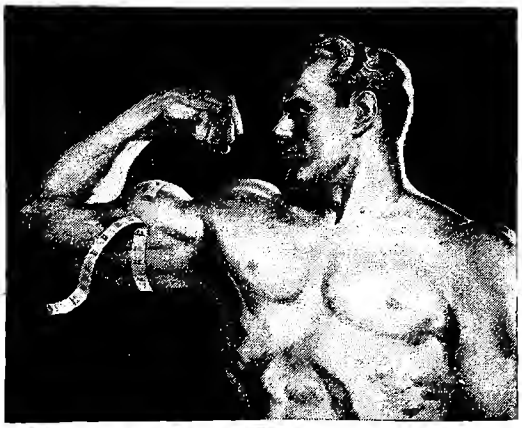

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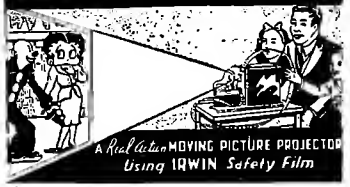

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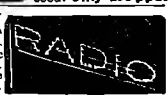

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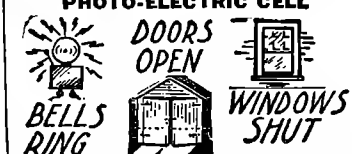

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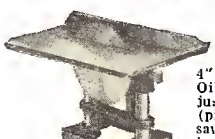

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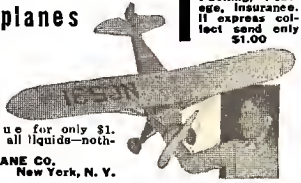

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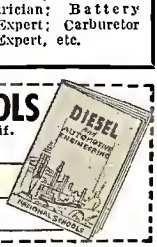

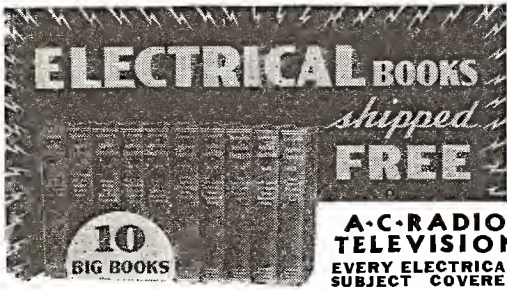

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Send for 10 days' free use, BI AND NEW 10 volume set of Electrical Engineering. In return for mailing this coupon promptly, send free certificate of membership in the American Technical Society entitling me to full consulting privilege for one year. I will pay the few cents delive y charges on the books. If I wish I may return them in 10 days and owe you nothing, but if I keep them I will send $2.00 after 10 days, then $3.00 a month until the special price of only $29.80 is paid,

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LEARN TELEVISION with RADIO—NOW!

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A Wooden Dish Luncheon Set

[*Continued from page* 128]

a block 2¾ inches square and 3¾ inches long, you fasten it to the medium size face plate, set the tail stock and start in on the dimensions shown in the drawing. Finish in the usual way, then turn down as many cups and saucers as are needed, mounting the stock on a small center screw face plate.

We can turn the lathe switch for good now, because the next and last unit—the salad server is largely scroll or band saw, carving chisel, and sandpaper work. Lay out the designs, full size, on squared paper as indicated, then paste this over the material and cut out. Do the rough cutting out on the spoon with a gouge or round point chisel, then finish with sandpaper under a rounded dowel end and finally finish in the usual way. Make the dowel hole a tight fit in the spoon handle end, and a loose fit for the fork, then glue the dowel in the tight-fitting holes.

Usually, these wooden dish sets are made in groups of 4 each, occasionally, six. A more uniform set can result if the four or six of a kind are made at a time — one after the other.

These same dishes can be made more serviceable and quite waterproof if, after sanding, they are immersed is hot linseed oil for some time, then removed and wiped off. They should then be set away for several days, again put back in the lathe and lightly sanded, then rubbed with a cloth and finally waxed.

Suez Canal—Keystone of War

[*Continued from page* 118]

The naval base of the British fleet in the Mediterranean is Malta, a strategic post up to the present in the control of that sea. However, Malta is just 58 miles from Italy's Sicily. An air force attacking Malta might succeed in breaking England's chain of military posts from Gibraltar to the Suez.

Italy could then attempt to cut the Mediterranean in two by throwing a submarine, mine and destroyer blockade across the sea from her own shores to Africa. If successful, she could carry her warfare eastward to the Suez and eventually to southeast Africa.

War or peace in Europe and Africa will undoubtedly depend on the Suez canal. If Mussolini can not discover an effective means of gaining access through it, he will have to forget his ambitions and withdraw from Ethiopia, so that the dove of peace can once more rest on the world. Should he believe his more modern military equipment is superior to the numerically greater forces of other powers the world will see the first test of up-to-date war tactics and armament.

new 1936 MODEL SOUTH BEND 9"x3' WORKSHOP PRECISION LATHE

10 NEW FEATURES, of this back-geared, screw cutting metal working lathe include: Twin Gear Reverse for Right and Left Hand Screw Threads and Automatic Longitudinal Feeds to Carriage; Ball Bearing Thrust Collar on Headstock Spindle; New, Improved Tailstock.

These and 7 other important improvements especially recommend this new 1936 model for auto service shops, electrical and repair shops—home shops and manufacturing plants—for fine accurate work in all kinds of metal and other materials. 38 attachments available.

Greatest Value we have ever offered in a back-geared screw cutting, metal working lathe.

$75.00 Less Motor Drive

ON EASY TERMS

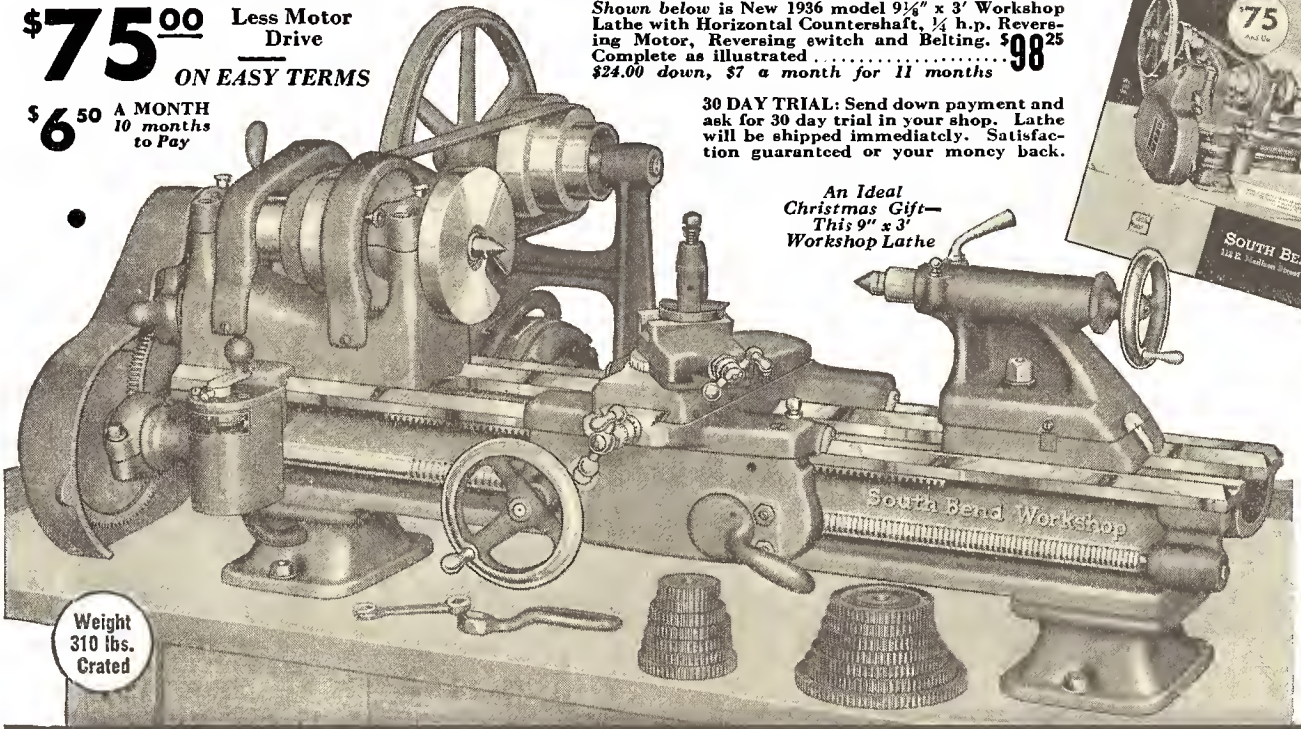
$6.50 A MONTH *10 months to Pay*

Shown below is New 1936 model 9⅛" x 3' Workshop Lathe with Horizontal Countershaft, ¼ h.p. Reversing Motor, Reversing switch and Belting. Complete as illustrated **$98.25**

$24.00 down, $7 a month for 11 months

30 DAY TRIAL: Send down payment and ask for 30 day trial in your shop. Lathe will be shipped immediately. Satisfaction guaranteed or your money back.

An Ideal Christmas Gift— This 9" x 3' Workshop Lathe



Weight 310 lbs. Crated

FREE! 32 Page Book

WRITE FOR new 32 page book showing, describing this 1936 model in 8 different drives and 4 bed lengths. Sent Free! **ASK FOR CATALOG 15-W**

• • • • •

96 other sizes and types of South Bend Back Geared Screw Cutting Lathes from $87 to $1500 are shown in Catalog No. 94. Sent free on request.

SOUTH BEND LATHE WORKS • • 517 East Madison St. • • SOUTH BEND, INDIANA, U. S. A.

Keeping Step with Industry's Ideas

Simplicity in itself is this jump rope. One change is important. It is made of rubber. It swings accurately, and will not kink.

A combination airplane for passengers and freight has been specially designed for aerial prospecting. It can land in limited areas, and carries all the equipment needed by miners, including mapping cameras.

A new ash tray holds half a pack of fresh cigarettes, 4 lighted cigarettes and has pockets to snuff out 11 lighted cigarettes.

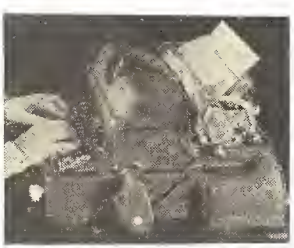
The 1936 outboard motors are now on display, with radical improvements being featured by all manufacturers. Live rubber mountings, concealed wiring and carburetion, greater power with faster and slower speeds, and lighter construction are the outstanding accomplishments.

A hot water car heater traps part of the circulating water in a "boiler," heats it up quickly, and keeps it hot even at high speed.

Commercial zinc plating on steel articles has been made possible by a new electro-plating process.

A sphere-shaped crystal microphone has been perfected to pick up sound from any direction.

A 5-meter transceiver is now available for voice communication over distances up to 100 miles. It weighs but 4½ pounds and is very compact.



Every mechanical movement of this new typewriter is electrically powered, including keys, space bars, carriage and ribbon.

A plastic material is now being used in slide fasteners in colors to match the garment or article employing the fastener.

A rocker type duplicator using one stencil can produce 1,000 copies of a letter in an hour at very low cost.

An extractor for broken axles has serrated jaws which slide over the broken shaft and grip like a vice when twisted.

A felt pad paint brush with aluminum handle, dispenses paint as a fountain pen does ink.

An electro-plater's microscope accurately reveals the thickness of plating at a glance.

A pliability comparator tests the adaptability of textiles, thin papers, transparent wrappings, leather, and other materials to various industrial uses.

Cork vibration eliminators on the base of a machine will not absorb oil or water, will last the life of the machine, and have a time lag which prevents bouncing.

Here is a row boat without oars, the arm power being transmitted to a propeller in the stern. The average speed is 8 miles per hour.

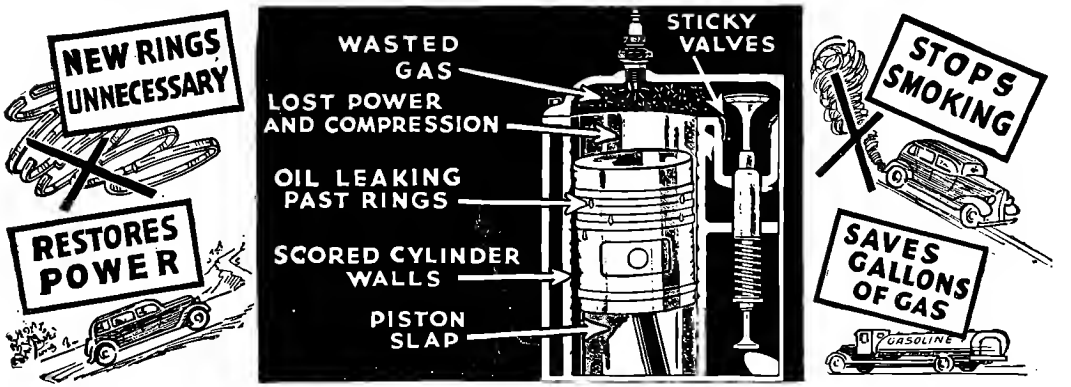
Linoleum can now be obtained with an adhesive already applied to the bottom. After brushing on water, it is sealed permanently to the floor.

Transmission belting is now made with a continuous vulcanization process which insures an even strength regardless of length.

A self-priming pump has been designed to recirculate water in fountains and waterfalls for rock gardens. It is powered with a ⅙-h.p. motor, and handles 150 gallons a minute.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped self-addressed envelope to MODERN MECHANIX AND INVENTIONS. *Manufacturers are invited to submit photos and literature covering new products for this page.*

OVERHAULS MOTOR AT 95% SAVING



Amazing New Discovery, Unlike Anything Else, Corrects Motor Trouble While You Drive Without Rebore, New Rings or Any Parts, Users Report; Brings Back "New Car" Zip, Power and Quiet, Ends Oil Pumping and Piston Slap. Costs Less Than Spark Plugs and Quickly Pays for Itself in Oil and Gas Savings. READ BELOW HOW YOU CAN TEST THIS NEW DISCOVERY FREE OF RISK. Then Mail Coupon.

If gas and oil bills are keeping you broke, at last science has discovered a revolutionary new way to solve your motor troubles at practically no cost. It is now unnecessary to have a rebore job and buy new pistons and rings. "OVRHAUL" reconditions your motor while you drive—**it pays for itself in oil and gas savings in no time,** is good for new or old cars, and **costs less than spark plugs.**

ADDS UP TO 45% GAS MILEAGE—SAVES UP TO 50% ON OIL

Makes Old Cars Run Like New

This new scientific method of motor recondition called "OVRHAUL" is so utterly amazing in its action that agents, salesmen and distributors are simply coining money. It is entirely different, never before anything like it. It is NOT a gasoline dope, carburetor device or other "contraption"—does not contain graphite. OVRHAUL penetrates metal pores, restores compression and power. It rejuvenates any old gas or oil eating car even if pistons slap so loud the owner needs no horn, or if it smokes like a furnace—and it adds pep and power almost unbelievable. It cannot harm the finest motor. Certified laboratory tests prove this. Gas mileage jumps up to 45%—oil consumption is cut to as much as 50%. Using OVRHAUL is as simple as ABC for anyone, and is necessary only every 10,000 miles.

Read What Users Say:

"New Rings Unnecessary."
"Stops Oil Pumping."
"Saves Rebore Job."
"Nearly Doubles Gas Mileage."
"Stops Smoking."
"Car Shoots ahead when I step on the Gas."
"Brought Compression Back to Normal."
"Used 68 gallons of gas on 1250 mile trip (about 18 miles to a gallon) BEFORE USING OVRHAUL. Made same trip AFTER TREATING WITH OVRHAUL and used only 48 gallons (which is 26 miles to the gallon)."

A FORTUNE

for Salesmen—Distributors WHO ACT QUICK

A chance of a lifetime. One sale multiplies itself in many more sales for YOU. Write quick. Get this BIG MONEY MAKING PLAN which enables distributors or salesmen to get SAMPLE AT NO COST—be first in your locality——Mail coupon below or 1c postcard today—NOW.

Free Sample Offer

And right now, Mr. B. L. Mellinger is willing to send you a FREE SAMPLE to test at his own risk. Send no money—just sign and mail coupon (or, a postcard will do). You can't for here's a revolutionary recovery every auto owner write quick—be first in ity. This unusual offer MAIL COUPON or po today—NOW.

WONDERFUL MONEY MAKER

No wonder every motorist is vitally interested—no wonder salesmen and distributors report it a sensational seller. Just bring it to the attention of auto owners and show how it gives motors new life, REDUCES UPKEEP COSTS and quickly pays for itself by what it saves then reap BIG CASH PROFITS. Two out of three auto owners want it and your profits will run into the hundreds in no time.

B. L. MELLINGER, *President*

OVRHAUL CO., P-600, Kansas City, Mo.

MAIL COUPON NOW

OVRHAUL COMPANY, B. L. Mellinger, President
P-600, Kansas City, Mo.
Without cost or obligation rush generous introductory sample offer, on "OVRHAUL," sent without risk to me.

Name .....

Address .....

City .....

( ) Check here if also want to know how to make money in sales agency of your own. This does NOT obligate in any way.

Welding

. . . the best way to make a perfect union of two pieces of metal is by welding them together.

. . . and the best way to make a good cigarette is to WELD together the right quantity of different types of mild, ripe obaccos

. that is just what we do in making Chesterfield igarettes. The three types of home-grown tobacos (Bright, Burley and Maryland) are welded toether. That is, the qualities of each of the three ds are made into one kind.

Then these three tobaccos which have been welded together are welded with aromatic Turkish tobacco.

ixing tobaccos is one thing; blending is another ning—but in order to get the best flavor and roma, the tobaccos should be welded together.

Chesterfield ... *the cigarette that's MILDER*

Chesterfield ... *the cigarette that TASTES BETTER*

) 1935, Liggett & Myers Tobacco Co.

Double-Page Spreads

Filming TABLE TOP EARTHQUAKES

by
EARL THEISEN
Honorary Curator of Motion Pictures, Los Angeles Museum.

When the director calls for floods, train wrecks, and volcanoes, the miniature men create the scenes. Read how they produce these effects.

Above—Filming destruction of a city by a volcano through the use of miniatures, as conceived by an artist. The burning boat is actually e moving pictura being projected on glass screen by the projection mechine. Erupting volcano is painted on glass, while cameramen et left photogrephs entire composite scene. Springs and rollers produce jerring for earthquake. Right—One step in photographing "Last Days of Pompeii." Water foraground and burning boat with reel-life actors remain to ha added to finish this scene.

Above—Destruction of New York City by earthqueke and flood in the motion picture "Deluge," a scene impossible except in miniature. Modal of the city wes huilt, aech building being e perfect reproduction. Walls wera then hrokan and reessemblad with edhesive tepe so thet thay could be pullad apart aasily. The liners ere modals in e tenk of water. Left—Test photo in an ettempt to balenca weter foreground with rest of scene for "Last Days of Pompeii." This scene now represents four superimposed pictures: The village peinted on gless; tha smoke and clouds; the volceno peinted on gless; reel life weter in which hoet and actors appeer. Flying birds are to be addad.

BEHIND the studio walls tucked off in a corner may be found the miniature department. It is hidden away where persons will not interfere with its work or find out its secrets.

To the miniature man everything is possible from the fabrication of airplane crashes, train wrecks, explosions, floods, to the bringing to life on the screen of prehistoric monsters. In this department of the studios is filmed those things that cannot be photographed or are too dangerous to be photographed in full size. The miniature men are specialists in reproducing literally on a table top practically anything that occurs in real life.

In a picture entitled, *Last Days of Pompeii,* the destruction of this historic city by a volcanic eruption can be seen on the screen. Because of the risk to human life and the expense involved, it was impossible to make the volcanic scenes other than by miniature. Besides, by using miniatures, a more forceful and realistic story could be made. Streams of flowing lava, smoke, flying debris, destruction of huge buildings, and other volcanic phenomena were reproduced for the screen in this picture. To do this was no simple matter; chemistry, physics, and much creative ingenuity contributed to the filming. Some scenes required as many as five trick superimposures exposed on the same film.

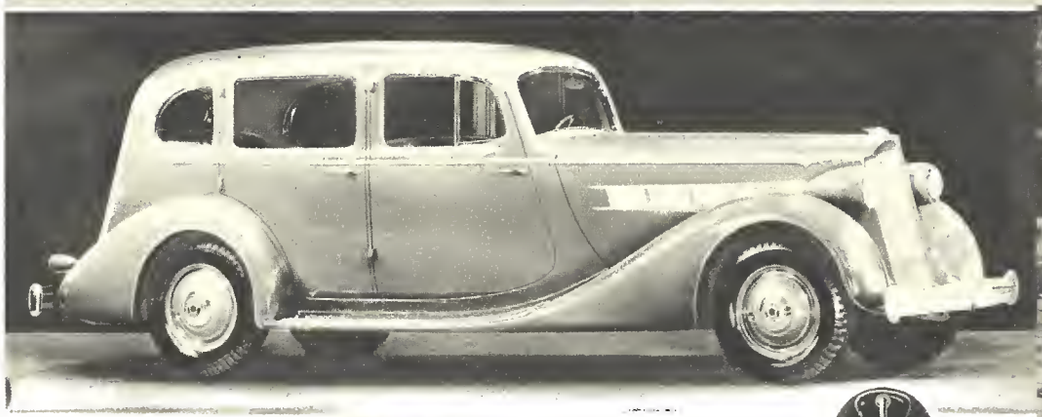
One such scene depicted a boat burning in the harbor of Pompeii. In the background Mt. Vesuvius was shown erupting while the streets of Pompeii began to fill with smoke and ash. The burning boat with real-life players was photographed in full size and then later added to the miniature scene by what is known in the studios as the "projection process." This process consists of projecting the movie of the burning boat to a screen placed in the miniature setting. The screen being of glass is easily camouflaged in the setting. By moving the projector, which was out of camera lines near the screen, a proper balance between the size of the boat and the miniature city was reached.

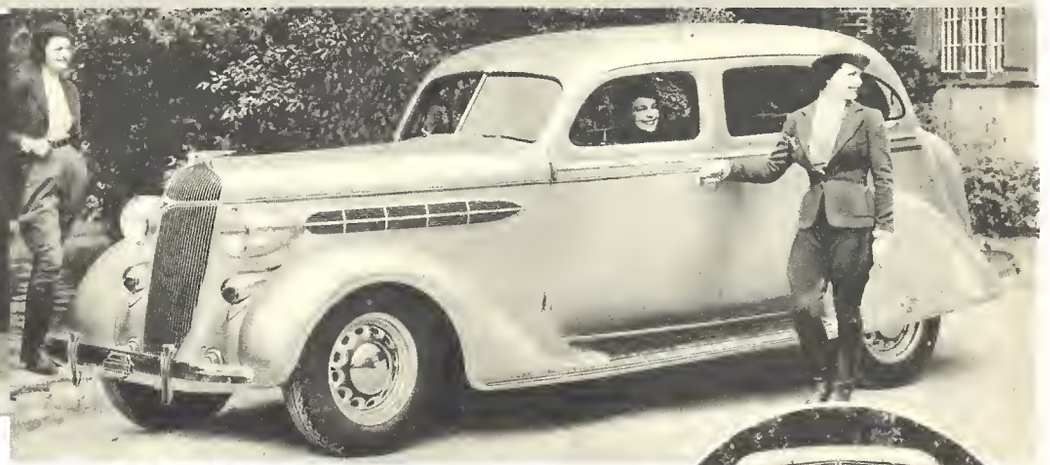
To photograph this entire scene it was necessary to run the negative through the camera five times, each time a different portion of the picture was photographed.

First the city of Pompeii was photographed showing the streets beginning to fill with smoke and ash. The negative was then rewound in the camera and a second exposure was made showing Mt. Vesuvius; then another exposure introduced the smoke and fire effects which were being ejected from the mouth of the volcano; finally the burning boat was added. A fifth exposure introduced birds flying about in the scene.

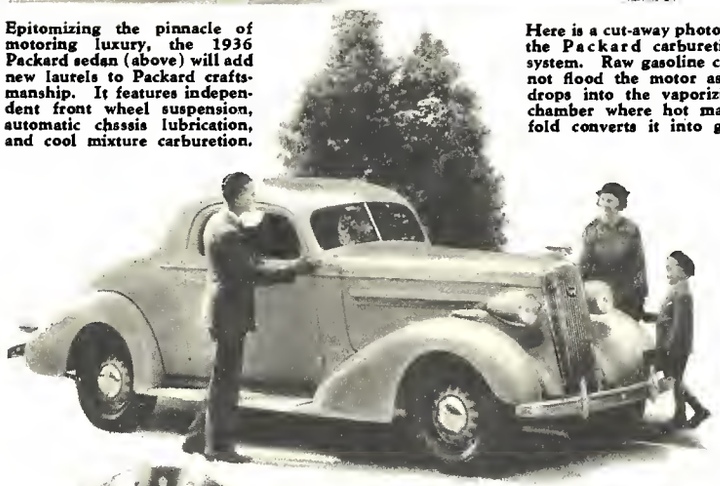
The various exposures were required because different methods or "processes" had to be used for the various effects. The smoke and fire effects had to be photographed at high speed in order to get the proper floating and billowy effect. Then the clouds were superimposed over the city by "stop-motion," which is the studio name for the process of photographing action photograph by photograph rather than continuously as is done

MM'S SHOWROOM of 1936 AUTOMOBILES

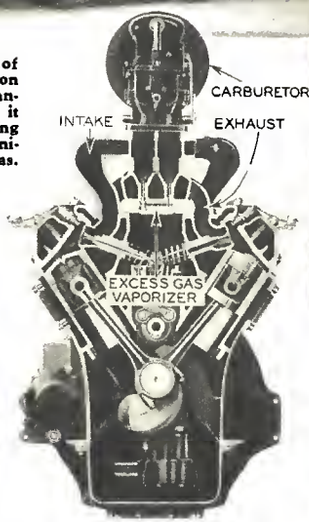


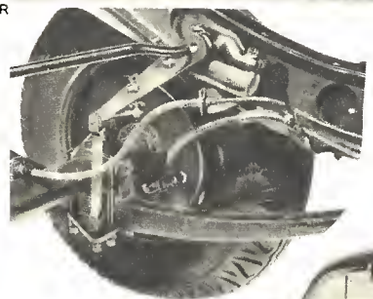


Epitomizing the pinnacle of motoring luxury, the 1936 Packard sedan (above) will add new laurels to Packard craftsmanship. It features independent front wheel suspension, automatic chsssis lubrication, and cool mixture carburetion.



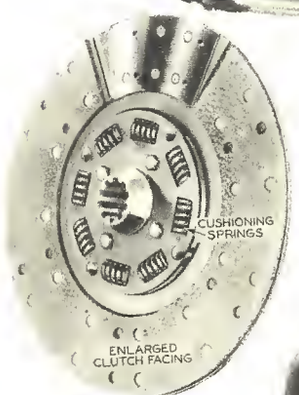
Here is a cut-away photo of the Packard carburetion system. Raw gasoline cannot flood the motor as it drops into the vaporizing chamber where hot manifold converts it into gas.





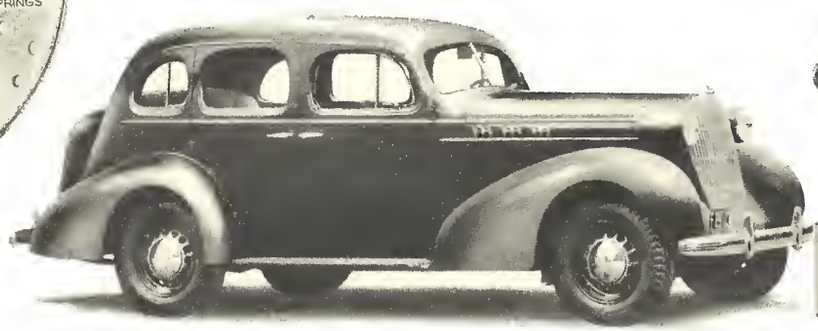
Adhering closely to the lines which made it so popular in 1935, the 1936 Chrysler has centered its attention upon added refinements in interior appointments and riding comfort. Left—A view of the rear wheel suspension of the 1936 Pontiac, showing sealed spring, shock absorber, hydraulic brake cable, and the oversize brake drum.

Above—The 1936 Chrysler Airflow as it will appear when you meet it on the highway. It is when seen from this angle that the airflow lines are most apparent, the fenders, hood, cowling and body blending together harmoniously.

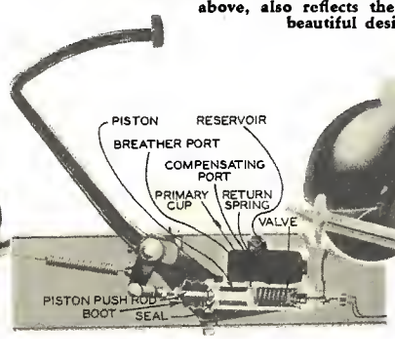


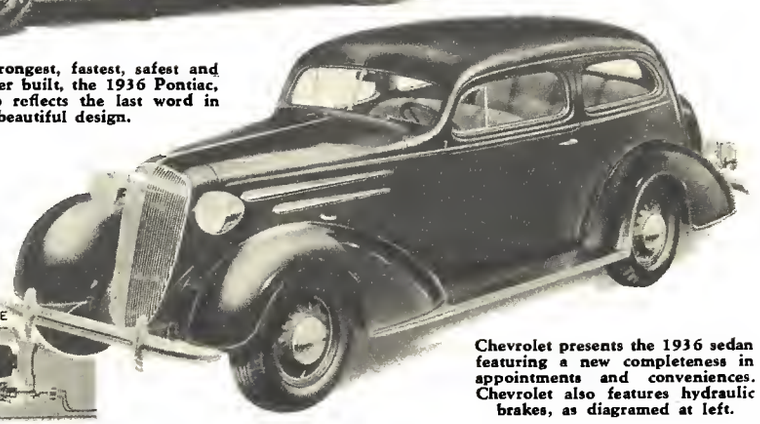
Upholding Buick's reputation for dependability and exceptional performance will be this sleek sport coupe (above) of Buick Series 40. It is powered by a 93-horsepower straight eight engine of valve-in-head design. One of its features is the new light-pressure clutch, shown at left. To provide additional smoothness when the clutch takes hold, individual cushioning springs are inserted between the fabric facing and metal base.

Described by its maker as the strongest, fastest, safest and most economical car they have ever built, the 1936 Pontiac, above, also reflects the last word in beautiful design.



Oldsmobile remains in the forefront in style streamlining with its 1936 models, and in addition has added several new refinements and mechanical features. The sedan model is at right.





Chevrolet presents the 1936 sedan featuring a new completeness in appointments and conveniences. Chevrolet also features hydraulic brakes, as diagramed at left.

The Story of Soap

FROM JUNGLE TO HOME

by
RALPH BAKER

Tramp copra traders, plying their boats in the mystic isles of the South Seas, come first in the romance of soap. In this scene the natives are gathering cocoanuts for the trader.

THE white meat of the cocoanut from tropical islands of the South Seas, oil from the cotton fields of the South, thyme and other herbs from shady gardens, soda and potash from desert mines, flowers from the flower-fields of Europe—these are the principal ingredients from which modern soap is made.

The origin of soap is lost in antiquity. Buried in the flaming lava of Vesuvius a soap maker of Pompeii met his death. Centuries later excavators found his shop with bars of soap in their original moulds. Even that is not the beginning. In 600 B. C. the Phoenicians made soap as a commercial product, and it was doubtless used long before that.

What is soap? Stated simply, ordinary soap is the result of chemical combinations of fats with soda or potash. Much more than this, though, enters into the modern manufacture of soap.

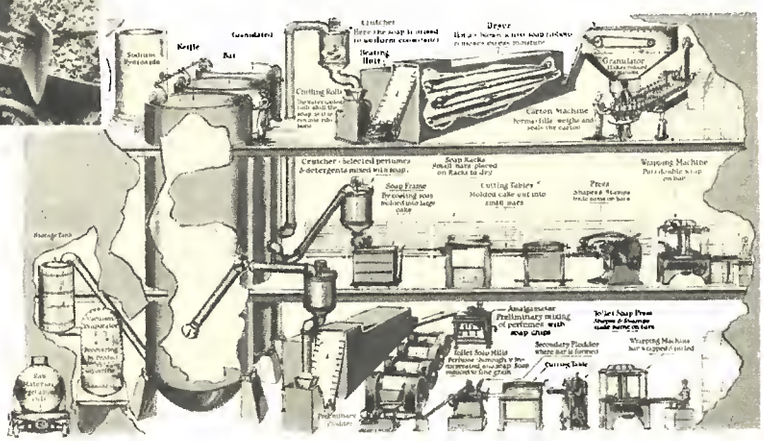
Cocoanut is one of the chief ingredients used. The copra, or dried cocoanut meat, upon arriving from the South Sea island, goes to crushers where it is ground, reducing it to a bran-like substance. Then it is ready for the oil extractors, where the oil, nearly two-thirds of the entire bulk, is pressed out.

From storage tanks the oil is pumped to the refinery, where it becomes a pure, sweet salad-type oil, some of which is sold to manufacturers of vegetable foods.

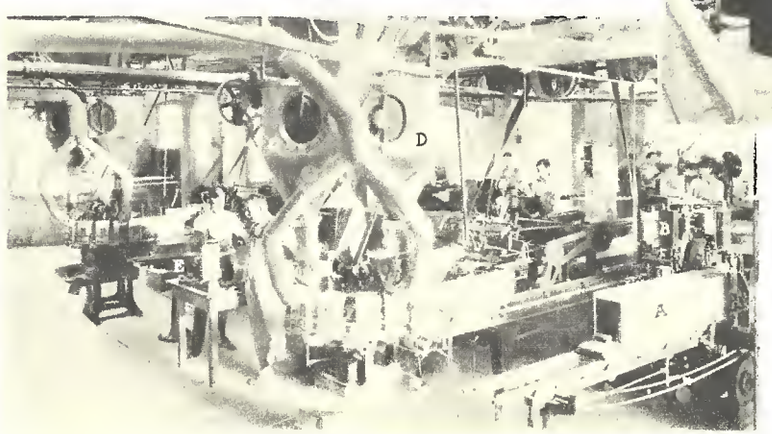
The oil is next pumped to soap kettles where it is saponified by adding a solution of sodium hydroxide, and boiled with live steam entering the kettles through pipes. Imagine twenty or thirty such kettles three stories high.

[*Continued on page* 130]

Here the dry cocoanut meat, called copra, is being unloaded in a U. S. harbor. From the docks it is taken to the extraction plants.



This diagram shows the steps in the operation of a modern soap factory. Vat 1 produces the toilet soaps being made on the lower floor; vat 2 yields the laundry soap being made on the second floor, and vat 3 produces the soap flakes on top floor.



Nearly two-thirds of the weight of copra is oil, which is extracted and stored in these tanks. One soap plant uses more than 250,000 cocoanuts daily.

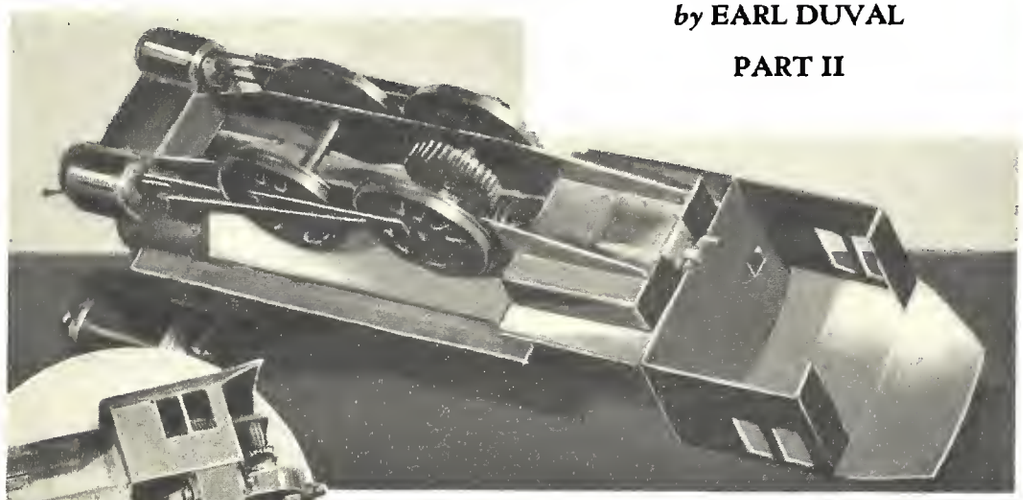
The flat soap cartons, A, are opened into boxes by machine B, and are filled with soap flakes as they pass under the hopper D. The flakes are shaken down on the rough track leading to hopper C, which then fills up the boxes again according to correct weight.

King Cotton plays a highly important part in the story of soap. From the cotton seed comes a cleansing oil which surpasses the unguents of ancient times. Here is cotton on a plantation in the deep South.

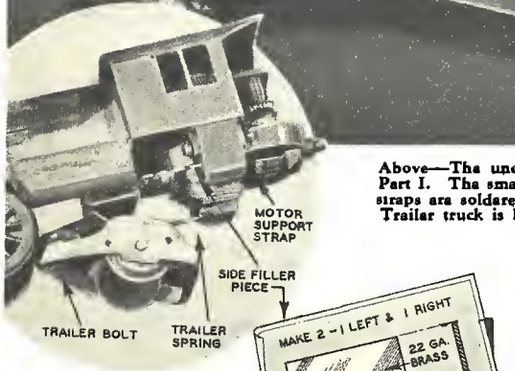
Making "Tiny Tom" a Real LOCOMOTIVE

by **EARL DUVAL**

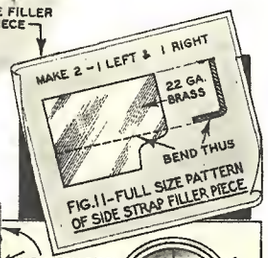
PART II



Above—The underside of "Tiny Tom" with construction as far as carried in Part I. The small electric motor is installed in the cab as shown at left. Brass straps are soldered to bottom of the field magnet on each side and to the cab. Trailer truck is hung loosely on bolt and part of weight is carried by spring.



Assembly of trailer truck is shown below. Drawings of truck wheels are full size.



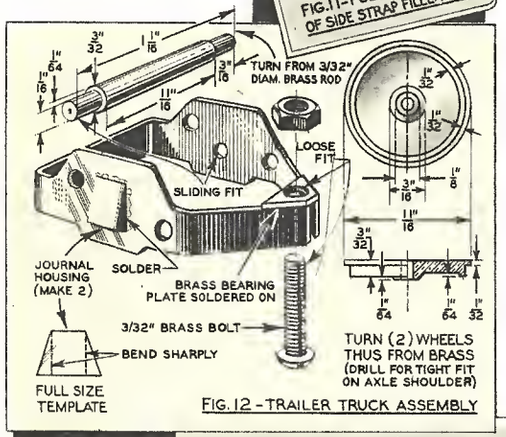

TURN FROM 3/32" DIA. BRASS ROD
LOOSE FIT
SLIDING FIT
JOURNAL HOUSING (MAKE 2)
SOLDER
BRASS BEARING PLATE SOLDERED ON
3/32" BRASS BOLT
BEND SHARPLY
FULL SIZE TEMPLATE
TURN (2) WHEELS THUS FROM BRASS (DRILL FOR TIGHT FIT ON AXLE SHOULDER)

FIG. 12 - TRAILER TRUCK ASSEMBLY

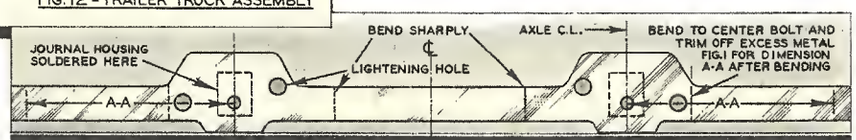

JOURNAL HOUSING SOLDERED HERE
BEND SHARPLY
AXLE C.L.
LIGHTENING HOLE
BEND TO CENTER BOLT AND TRIM OFF EXCESS METAL FIG. 1 FOR DIMENSION A-A AFTER BENDING
A-A
A-A

FIG. 12-A - FULL SIZE PATTERN OF THE TRAILER-TRUCK FRAME — CUT TO INSIDE OF OUTLINE —

Trace this truck frame template on 22 gauge brass. Cut and bend frame to shape shown in drawing at upper left. Insert axle and wheels before soldering brass bearing plate to the frame. Do not drill the axle holes until frame is bent to shape.

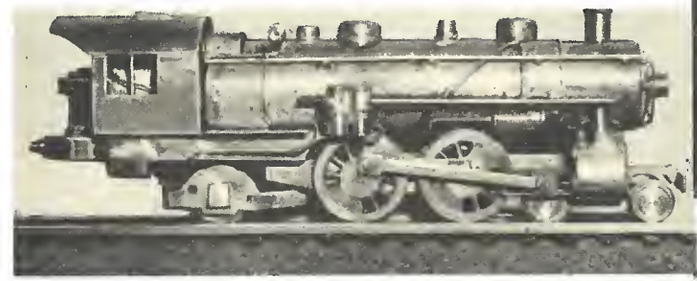
IN THE first part of this series of articles the construction of "Tiny Tom," an 00 gauge version of a Southern Pacific railroad locomotive, covered the initial stages of the model. Building of the boiler, cab, frame, drive wheels, and cylinders was described.

This model locomotive, which costs less than five dollars to build, will be completed in this issue and next month construction of the tender will be described in detail.

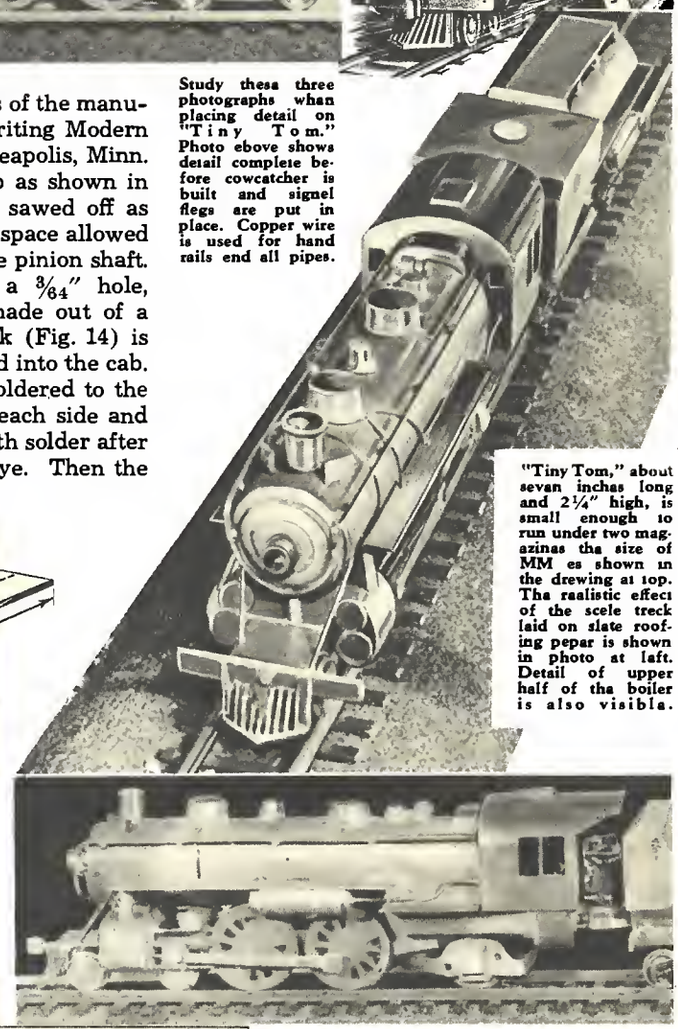
Once the drive wheels and drive and connecting rods are on the model it is necessary to quarter the wheels before fixing them permanently. This is done by setting the crank pins on one side of the model on a straight line through the axles and at right angles to the track as shown in Fig. 1. On the opposite side give the wheels a quarter turn toward the cab so that a line through the crank pins and the axles is parallel to the track. Quartering is necessary to assure smooth running.

"Tiny Tom" gets its power from a small electric motor made especially for 00 gauge locomotives. Name and address of the manufacturer can be obtained by writing Modern Mechanix Publishing Co., Minneapolis, Minn. The motor is placed in the cab as shown in Fig. 9 of Part I. The shaft is sawed off as short as required and about $\frac{1}{32}$" space allowed between the motor shaft and the pinion shaft. Both shafts are drilled with a $\frac{3}{64}$" hole, through which a chain link, made out of a paper clip, is inserted. The link (Fig. 14) is put in after the motor is soldered into the cab.

Two small brass straps are soldered to the bottom of the field magnet on each side and the straps sweated to the cab with solder after the shaft is lined up with the eye. Then the



Study these three photographs when placing detail on "Tiny Tom." Photo above shows detail complete before cowcatcher is built and signal flags are put in place. Copper wire is used for hand rails and all pipes.



"Tiny Tom," about seven inches long and 2¼" high, is small enough to run under two magazines the size of MM as shown in the drawing at top. The realistic effect of the scale track laid on slate roofing paper is shown in photo at left. Detail of upper half of the boiler is also visible.

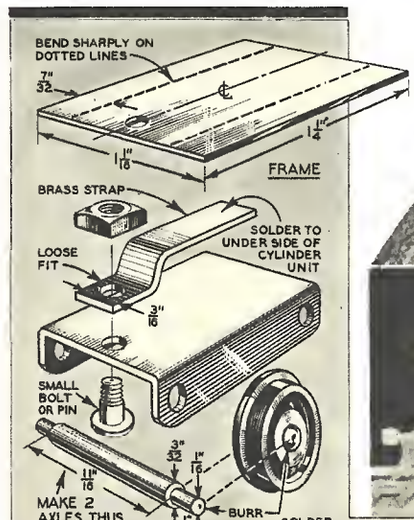


FIG. 13 - COMPLETE DETAILS OF THE PILOT TRUCK ASSEMBLY

Construction of pilot truck is shown in Fig. 13. Front and side views are full size. Cut frame from piece of 22-gauge brass and bend as shown. Axle holes are drilled after bending by placing block of wood between frame sides. Locomotive frame must be cut away to give pilot truck clearance as shown in Fig. 9, which also shows location of the brass strap

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